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"THE 1915 EXPOSITIONS"

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FROM the standpoint of the industrial arts an exposition is of striking interest. All phases of the crafts are involved on a huge scale. The live art of the landscape gardener; the housing problem of the architect; the problem of city planning in the municipality; all have combined in the great scheme underlying such a show as may be found at San Francisco and at San Diego.

In close co-operation with these artists are found the sculptor, the painter, the decorator and designer and that group of lesser lights who deal in the actual construction itself. This last group receives little credit as a rule; and yet it must be composed of men possessed also of imagination and creative ability.

Their problem is to gain the desired effect in such temporary mediums as may be given them; a task which calls for the keenest inventive faculty. An example may suffice to illustrate this. Exposition designs called for a rough texture in imitation of Roman travertine for outside surfaces. It was found that by throwing a little sand at intervals in the mold next to the outside this mottled effect was produced, for as the mold was withdrawn the sand parted from the cement or plaster, thus leaving slight irregular depressions in the otherwise smooth surface. This may be noted on the square columns at either side of the arch in Plate D.

The first impression of the Panama-Pacific International Exposition at San Francisco appeals to one's color sense, for nowhere is the glaring white plaster of the earlier expositions to be found. Our common color terms are wholly inadequate, misleading and almost futile when one tries to describe the color city of California; but try if you will to picture wall surfaces a sandy yellow, tinged with red, and you have the background. The immediate foreground, the

walks, give a similar color, for the actual sand scattered over the concrete beneath has been passed thru a heating process to gain the desired effect.

Playing against these warm colors imagine other colors of brighter hue running from the rich greens of the grass, thru the dark green of trees and shrubs and blue-green domes and columns, to the salmon-red walls of the colonnades and the red tiled roofs. Pick from your files the color prints of Guerin's Egypt and your palette for the exposition lies before you.

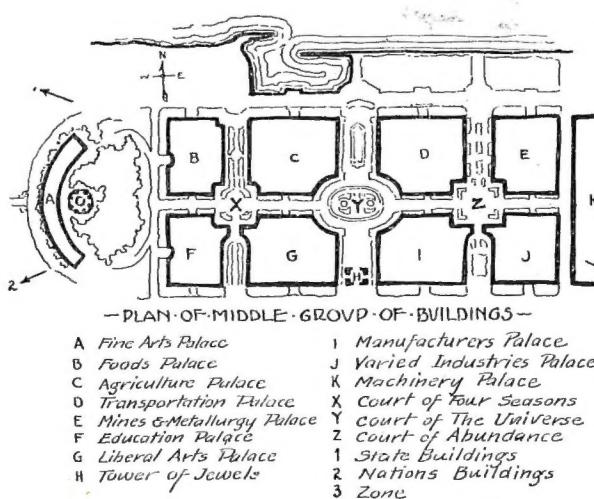
The second impression of this wonderland is a feeling of permanence and stability. Full grown trees, flowering shrubs and vines and that sense of finish that you find everywhere in England is distinctly noticeable here. As you wander thru the stately avenues it is hard to realize that but a few short months ago all was unclaimed marshland and the city a vision, and it is still harder to believe that in much less time to come the buildings must be razed to the ground.

The third impression is of its orderly and admirable arrangement. That first law of all good design, *unity*, is everywhere apparent. The simplified plan of the main part of the exposition, exclusive of the foreign and state buildings and the "zone," shows the unity of this central and most important of the three big groups. (See the plan.)

In any landscape design the foundation or framework upon which the plan is based may show radiation from a given point, or it may offer a given axis upon which the various elements are balanced. The latter treatment is to be noticed here with the Palace of Fine

Arts and the Machinery Palace flanking either end of the long axis, and the main entrance and marina flanking either end of the short axis. Upon this simple, unified framework the exposition was built and nothing was allowed to break these connecting links.

Leaving the Innside Inn the first view which presents itself is that illustrated at Plate A. Across the delightful Holland garden rises the huge glass dome of the Horticultural Palace and



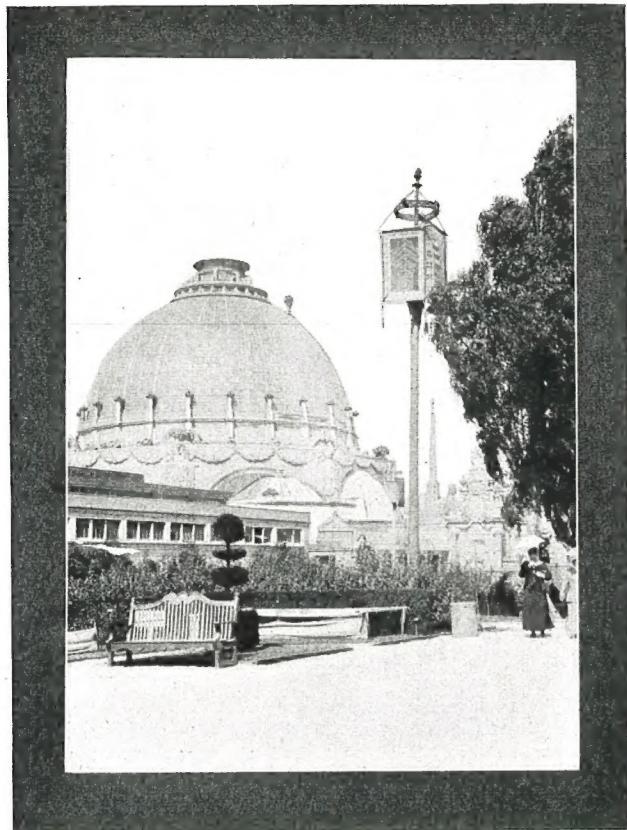


Plate A. Dome of Horticulture Palace.

standing immediately in front of you is the decorative lamp post which serves also as a banner pole. Echoing the dominant notes of the buildings these banners are hung on three sides of the lights, thus serving to enliven

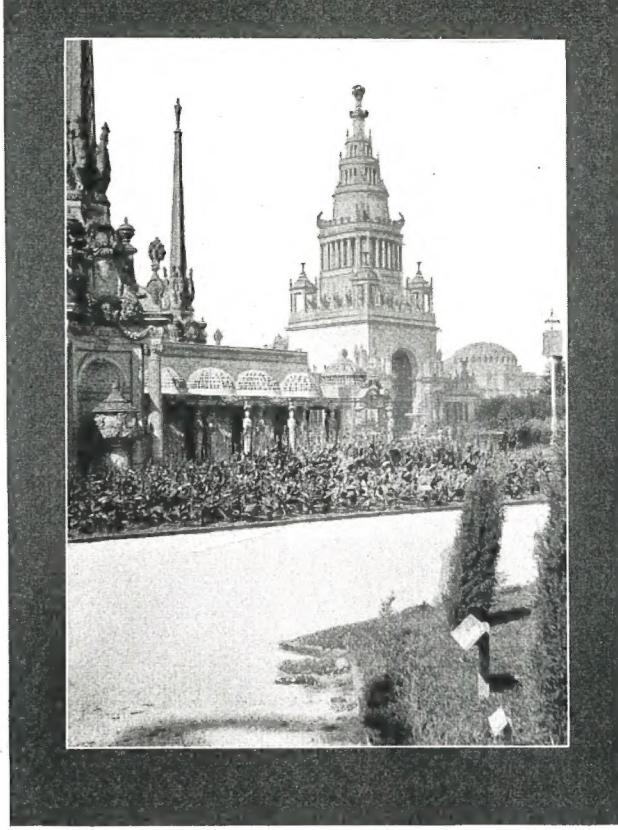


Plate B. Tower of Jewels.

the avenues by day and to veil the lamps for the pedestrian by night, while at the same time they concentrate all light on the buildings.

Passing thru these gardens you come at once to the pivoting point of the whole exposition. Reaching to an unrealized height of 435 feet the Tower of Jewels sparkles in the bright sun. (Plate B.) Architecturally the tower is not strikingly beautiful with its series of bandboxes and rather monotonous columns but upon two occasions it was truly magnificent. The first was upon a brilliant, sunny day. In the early afternoon when the sun was high overhead the many thousands of jewels twinkled and blazed their tiny red, green, yellow, blue and topaz lights until the tower fairly trembled and danced for joy. The second time was upon a day sunny everywhere but in San Francisco. Great banks of white fog had literally rolled in and had shrouded the tops of the buildings, until the great tower could be dimly seen reaching into the moist white depths above. With its broad base firmly planted in the ground, it rose mysteriously into unknown space to be stopped only by one's imagination.

The shorter axis of the general plan of the main group of buildings runs thru the Tower of Jewels and it is from this point that the visitor makes his start. In front lies the great oval Court of the Universe. (Plate C.) Huge arches tower on three sides. Their scale is only realized by comparison with the figures about to pass beneath. Here one might linger a day and then not exhaust the many features of interest. The color, the fountains and pools with their reflections, the ban-

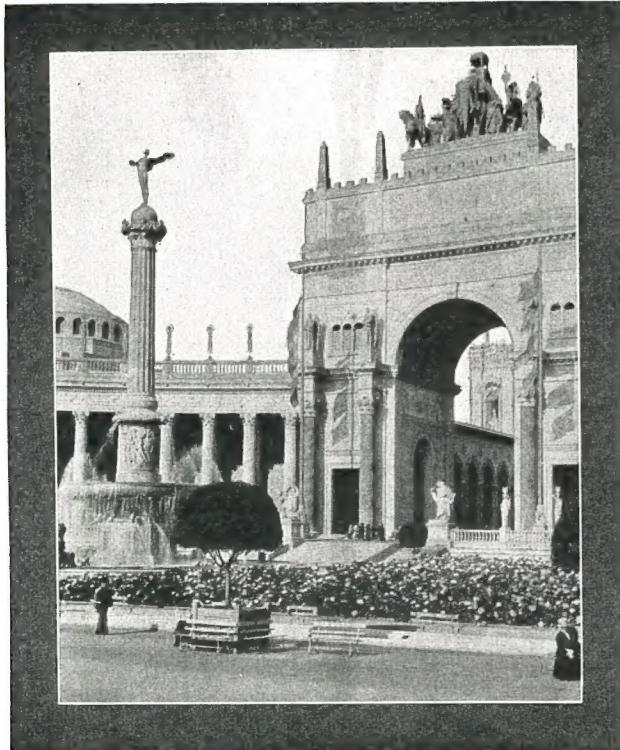


Plate C. Arch of the Rising Sun—Court of the Universe.

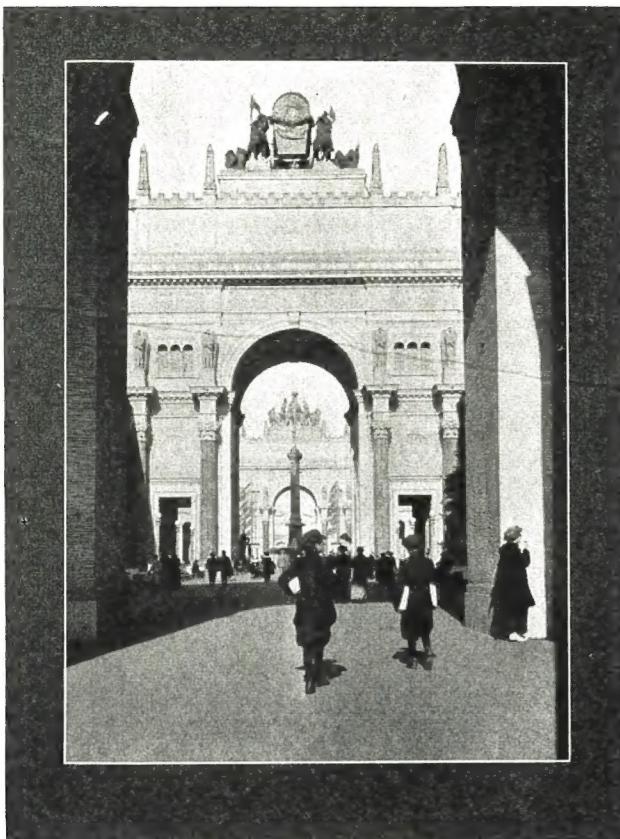


Plate D. Toward the East thru the Arch of the Setting Sun.

ners, the relief sculpture and the sculpture in the round, the mural paintings and the architecture itself are all harmoniously presented for pleasurable study.

Crossing the short axis in this court, in the center, is the long axis running east and west from the Palace of Machinery to the Palace of Fine Arts. (Plate D.) Somewhat loath to leave first impressions you finally decide to turn to the right or east. Passing beneath the Arch of the Rising Sun (seen in Plate C), which supports the colossal group, The Nations of the East, you come to the Court of Abundance and are held spell-bound at its entrance. The Tower of Jewels is a tower and, except under certain conditions, little else. Here a vision made real confronts you. (Plate E.) Its lines trend upwards yet it is not Gothic; its arches suggest the Roman yet they combine lightness and grace with strength. Here exists a feeling of richness and reserve, of vision and understanding delicately wrought.

This court by Louis C. Mullgardt displays the development of the ages, and decorative motives from all sources of life have been utilized. A wonderful study is offered for the teacher of design. Sea life, vegetation of all kinds, the earth's dumb animals and man, all have their symbolic treatment displaying their evolution. Decorative motives are derived from the tortoise, sea shells, and kelp, from reptiles, birds and animals, and finally from man in early, middle and late stages of life and civilization. In Plate F you may notice the cock and the human figure used as finials and plant life ornamenting the bands of the arches. With the great searchlights playing over all and the great urns as seen

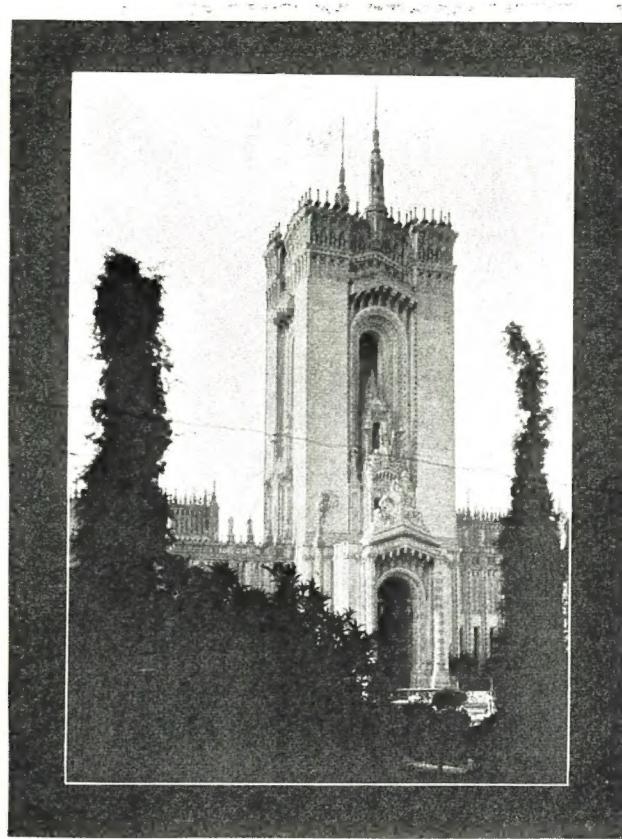


Plate E. Tower in Court of Abundance.

in the foreground belching forth firey steam, lighted by red lamps within, the night effect is no less marvelous

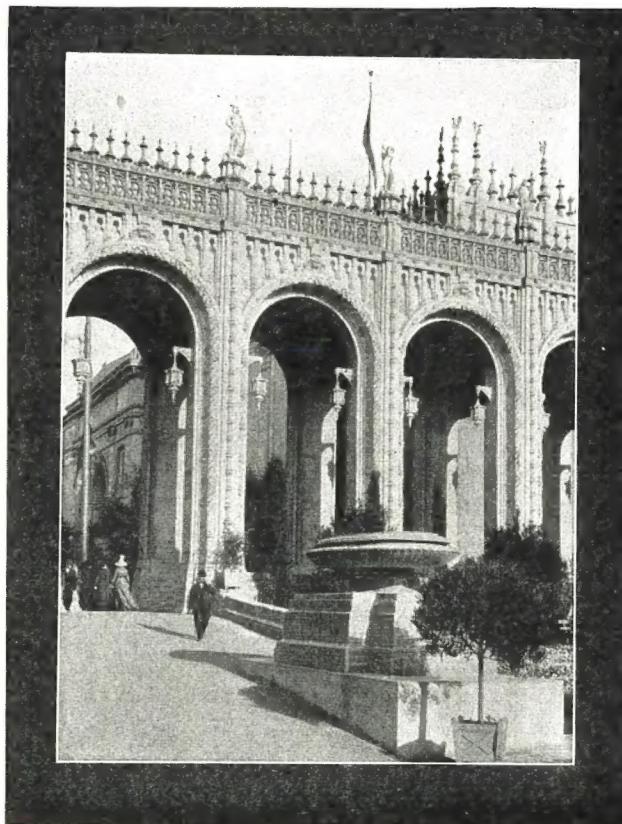


Plate F. Court of Abundance.

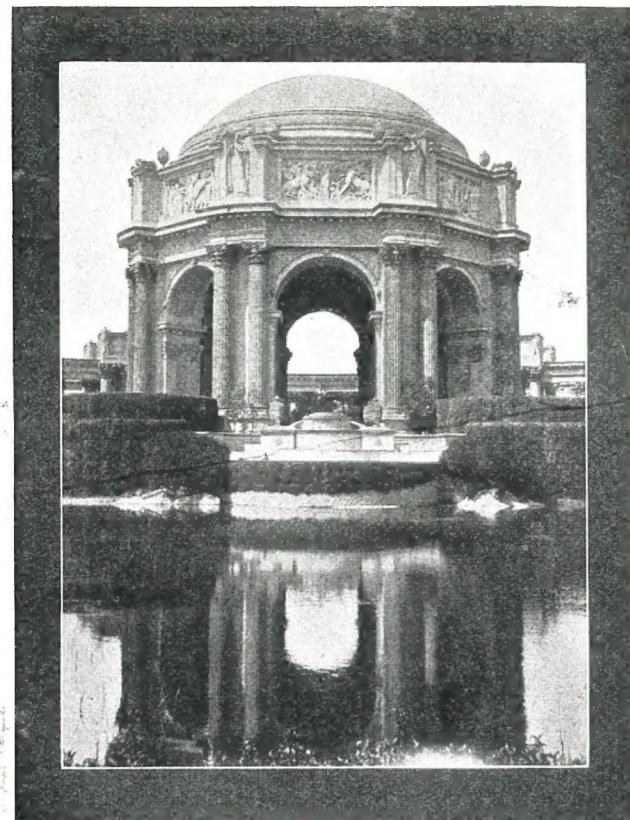


Plate G. Rotunda—Palace of Fine Arts.

than the effect by day. The Court of Abundance is a treasure house of art, a veritable shrine of worship.

Turning with a sigh of satisfaction you wonder if anything can surpass this court. Returning again to the Court of the Universe which now seems cold, formal and big, you are caught by the glimpse of a new attraction seen thru the western Arch of the Setting Sun. (Plate D.) You pass thru the Court of the Four Seasons which you file for future study, and approach the finest thing of all, the Fine Arts Palace. (Plate G.) At once you feel that here is a grand idea conceived by a man who is capable of both dreaming and of carrying out his dream.

Before you stands the magnificent Rotunda, reflected rhythmically in the natural waters of the lagoon, and embraced by the semicircular colonnade of the Fine Arts Palace. It quickly calls to mind Brueckner's "Isle of Death" and yet here is something more, for here is the spirit of life, majestic, dignified, inspiring.

The Rotunda rises to a height of one hundred and sixty-five feet. Double columns of graceful Corinthian lines support huge figures in high relief which typify Greek classic art. In the panel spaces between these figures, and in lower relief, are scenes relating to Poetry, Art and Music. Between the pairs of columns are beautiful Roman arches supporting the whole. Below, and in front of the central arch, is the kneeling figure of Art keeping ever alive the fires of inspiration. It is this figure, breaking the almost symmetrical balance of the Fine Arts Palace, which centers the whole composition. Flanked on both sides by green hedges and by the curv-

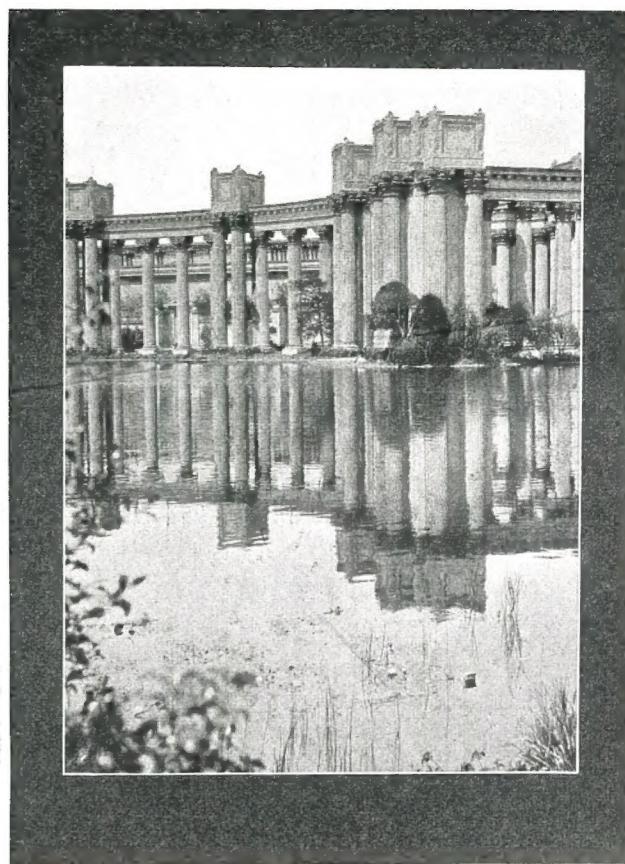


Plate H. Colonnade—Palace of Fine Arts.

ing ends of the colonnade, the Rotunda and its surroundings are truly an inspired work of art.

The unusual charm of the Palace of Fine Arts lies in the many vistas offering ever changing aspects enhanced by wonderful reflections. (Plate H.) From almost any angle you may glimpse some other part of the building and in no two instances will you find the views alike.

Upon entering one end of the colonnade you lose all sense of work-a-day things. You are at once impressed with the solemn dignity of the tall columns, the luxuriant foliage and the changing views, and so in a hushed spirit of devotion you make your entrance to the great works of art housed within. (Plate I.)

No less beautiful in the daylight is the Fine Arts Palace by night. The lighting effects of the whole exposition are quite unusual. In addition to the screened lamps as indicated earlier in this article, there are the big search lights playing over the architecture and sculpture, making the spectacle a real dreamland. Naturally the most beautiful buildings by day become the center of the illumination at night. The wondrous beauty of the Fine Arts Palace is but feebly illustrated in Plate J. The same decorative details, the trees, the shrubs, the sculpture and the almost perfect reflections give a new charm to what was thought perfection in sunlight and the infinite possibilities of artificial lighting are unfolded.

To stand on the edge of the Fine Arts Lagoon, at the deep dusk of the evening, and watch with almost suspended breath the illumination appear so quietly,

gradually and mysteriously is a sensation never to be forgotten. You admire in silence and in silence you end the full day of sightseeing, lifted above the petty thoughts of life, absorbed, transcended, satisfied.

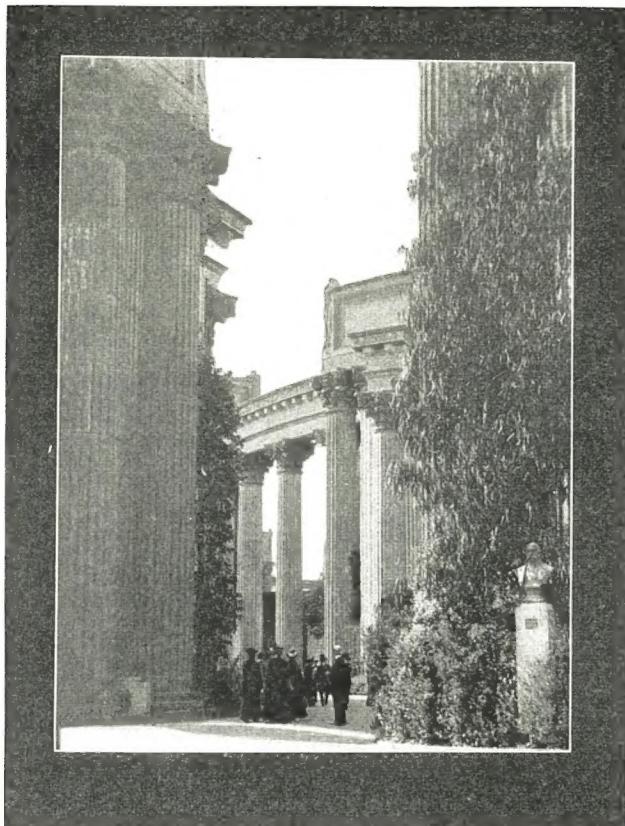


Plate I. Entrance to Colonnade—Palace of Fine Arts.

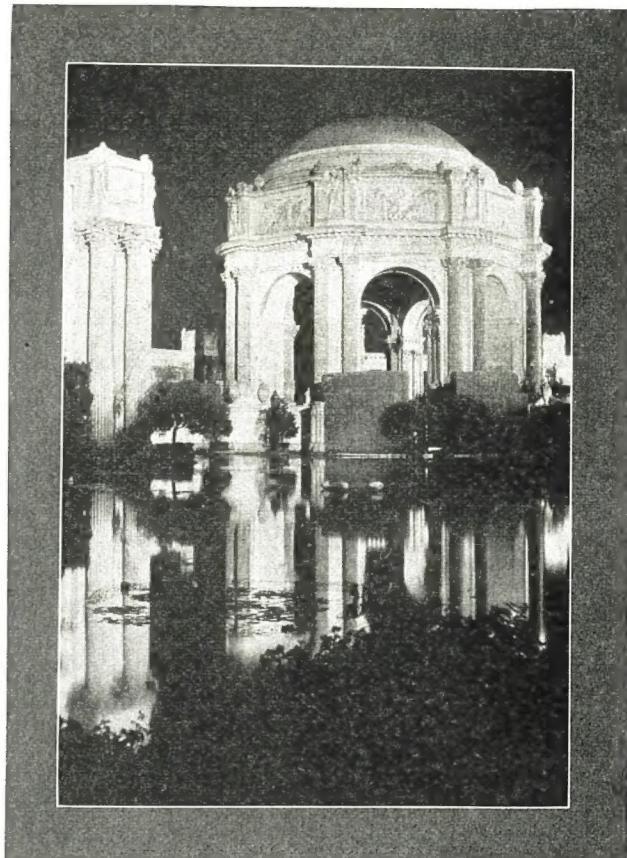


Plate J. Illumination—Palace of Fine Arts.

THE illustration on the cover of this issue of the Magazine is reproduced from a mural painting at the Panama - Pacific International Exposition, San Francisco. The artist is Milton Bancroft.

SHOP METHODS IN VOCATIONAL SCHOOLS

Wilson H. Henderson



HERE is a wide difference of opinion among educators regarding the proper methods to be used in school shop instruction. Some hold that the school shop should be similar

in all essential respects to the commercial shop, and that the pupils should be required to make a commercial product in quantities, in the same manner that the same product is made in a factory. Others contend that the shop processes should be analyzed and each process taught in its proper sequence, without regard to the commercial method of performing the same process. They feel that there is an *educational content and method* which should be emphasized in the teaching. Some feel that there is no essential difference between manual arts instruction and vocational shop training. Those in the manual arts group feel that a problem is educational only when it requires thought on the part of the pupil—that there is very little to be gained educationally in the continued repetition of a process.

The aim of manual arts instruction has been largely the arousing of mental activity thru directed manual activity, or in other words stimulating mental processes by means of shop projects requiring thought, and in which the pupil is interested. That is to say, the purpose of manual training has been to develop the thinking and reasoning faculties of the pupil by means of manual activity, which has led some persons to say that manual training is a method rather than a subject. The purpose of this paper is to point out, if possible, a fundamental difference between the methods used in manual arts instruction in most schools, and those to be followed in vocational schools.

It has been stated repeatedly that the purpose of education is to adjust the individual to his surroundings. Psychologists tell us that every object which comes within the range of the consciousness of the individual constitutes a stimulus of mental activity, and that education is the process of adjustment of reactions to sensations or stimuli. They tell us that after the intellect has repeatedly made the same reaction to a given stimulus, the process becomes automatic and a habit is established. A new stimulus or sensation will cause the individual to react in a consciously determined manner. A repetition of the sensation will call for a less degree of conscious attention to the reaction, and a continued repetition of the experience will in time cause an automatic or habitual reaction with no conscious attention. The intellect can then respond to the sensation automatically, with no conscious effort on the part of the individual, while at the same time reacting to stimuli in other situations, which require conscious adjustment.

For example, the person experiencing the sensations of riding a bicycle for the first time, finds himself unable to adjust himself to all the new sensations which crowd in upon him. For a while his whole attention is centered on steering and he forgets to pedal. Then his attention is centered on the pedals and he forgets to

steer and runs into a tree. As the experiences are continued, less and less attention is given to the pedalling and steering, and the rider can give attention to a conversation. When the processes of riding become habitual, that is, when the reactions to the sensations become automatic, the rider can assign the work of balancing, pedalling and steering to the lower centers of the brain (or as some would express it, to the subjective mind), and use the higher centers of the brain for planning the day's work or even reading a newspaper. The moment, however, that an unusual sensation comes to the brain—a punctured tire, a runaway horse, or a rough road—the attention is at once focused on the immediate situation, and all other matters are temporarily forgotten.

The manual training method of using a bicycle would be to teach all about the steering arrangement, how turning the handle bar changes the relation of the front and rear wheels and the forward movement of the bicycle changes its direction. It would also include a study of the pedal or crank, a lever of both the first and second classes involving the principle of the windlass, the relation between the number of sprockets of the large and small sprocket wheels and the distance traveled in one revolution of the crank, etc. This would be followed by a demonstration lesson in riding and perhaps an experimental ride on the part of the pupil.

In such a lesson the pupil would be constantly receiving new sensations, and his intellect would be reacting to them endeavoring to adjust them to other sensations which had been received. The lesson would be highly educational in that the pupil's interest would be keen, and his attention would be close in order to understand the method of continuing the forward motion, maintaining equilibrium, and changing the direction of motion. If the aim of the lesson is to teach principles of mechanics, the purpose has been realized, but such a lesson would not give the pupil any skill or proficiency in bicycle riding. In order for him to acquire any degree of expertness he must experience all of the sensations of riding until the proper reactions to them become automatic or habitual. In other words he must acquire bicycle riding habits, and when he has done so, he can experience all of the sensations and respond to them with no conscious attention, and at the same time attend to other matters such as reading sign posts or talking to a companion.

A familiar example of the automatic response to certain stimuli, is the playing of a piano. The beginner must first learn to play scales with one hand, then with the other, then with both hands simultaneously, devoting his entire attention to his hands. In time he learns to look at the music and play without even looking at his hands. The expert player reads four or five notes at a glance and strikes the proper keys automatically while his mind is noting the expression required by the music. The player on a pipe organ uses both hands and both feet at the same time that he is watching the direc-

tor and noting the time. Suppose that the expert pianist should be called upon to play on an instrument on which the white keys were one-eighth inch narrower and the black keys one-half inch shorter than on the standard keyboard. His habits would immediately refuse to *function* and all his attention would be devoted to the unusual sensations coming from the keyboard. The stimuli would be unusual and the reaction would not and could not be the same as to the usual sensations. The acquired habit would be of no avail as it could not respond to the stimuli in the unusual situation. Every church organist insists upon being permitted to practice on the church instrument in order to acquire the habit of reacting automatically to the sensations received from that particular instrument.

We have all seen boys whose attention was so closely given to the action of a lathe and the cutting of the chisel that they forgot to stop the machine and the chisel at the proper time. The noise of the machine, the whirling of the wheels, the action of the chisel, and the motion of the wood demanded all of their attention, and everything else was forgotten. It was an excellent lesson for the boys, and the experience was of such a nature that few of us will ever forget our first experience with a lathe. But in order for a boy to be of any value in a woodturning shop, he must experience those sensations until the reactions to them, that is, the motions of the hands, become habitual. He can then devote his attention to a drawing or to planning the next operation.

The purpose of vocational training is to develop in the pupil, correct *habits* of conduct in order that the mere tool processes may be in a large measure automatic, leaving the mind free to read the drawing, to watch the machine, to plan the next operation, etc. In order for the habit acquired in the school to be valuable in the commercial shop, the machines, the tools, and the operations must be such that the habits developed will function in the commercial shop. It is not enough that the boy know the reasons for performing given operations in a certain manner, but he must in addition have a habit which will allow him to perform the manual operation, while his mind is planning the work. Any occupation higher than that of a mere machine tender requires more than the mere manipulation of the tool or material. This is not always apparent to the uninitiated observer who sees in the work of the machinist only the shifting of a lever, the turning of a handwheel, the setting of a screw, the oiling of a bearing, and the shifting of a belt. There is a large element of thinking, watching, planning, knowing the proper crank to turn and when to turn it, that has been overlooked in some of our industrial surveys. If the manual operations are not automatic, the mechanic cannot devote any degree of attention to the mental side of his work, and it is the amount of brains which a man uses in his work which determines his value and consequently, his wage. The point I wish to make is well illustrated by the work of a typist. Any intelligent person can learn *how* to punch the keys of a typewriter, to insert the paper, to space between words and lines, in a few minutes, but a typist who cannot operate the machine without watching her

hands, and who does not know a great deal more than the mere mechanics of operating the machine, is not wanted in any office.

If the foregoing is true, it is highly important that the vocational school *shop* have the same machines, use the same methods, and in all matters influencing the working habits to be acquired by the pupils, be the same as the best commercial shops. It is also essential that the school develop the ability to understand all of the processes and the reasons for performing them in a given manner. The vocational school should use the manual training methods in developing the reasoning and thinking faculties, but should carry the tool processes farther and develop correct habits of performance, in order that the pupil may use his reasoning and thinking faculties while doing the manual work.

The science of mnemonics teaches that the association of ideas has a considerable influence on the facility of the memory. That is, ideas closely associated will be recalled at the same time. Many of us, when we see test tubes, beakers, bunsen burners, etc., at once remember something of the chemistry we learned in the laboratory. These objects are associated in our memories with chemicals and formulas, and the entering of one into our range of consciousness immediately recalls the other. In order to take advantage of this principle, in teaching shop subjects, those things which we hope to have the pupil recall in his shopwork, should be taught in close relation to the shopwork. If we wish to have our pupils recall certain mathematical principles when they operate a lathe, those principles should be taught in connection with the use of the lathe, in order that in after years, contact with a lathe will not only recall certain reactions of the hands, but will recall the mathematics.

Under the present practice, in order for the pupil to recall certain mathematical principles, he must associate them with a schoolroom with desks, blackboards, examinations, demonstrations, and lectures, far removed from shops, machines, tools, work and overalls. To illustrate: to my mind the thought of making an elbow in a ten inch tin pipe, immediately recalls a tin shop with bench, tools, scribes, etc. The thought of developing the surface of a ten inch cylinder intersecting a similar ten inch cylinder at an angle of ninety degrees recalls a school drawing room with drawing board, T-square, triangles, etc., because I was taught one in the shop and the other in a school drawing room. If we wish to have our pupils associate in their minds intersections and developments with sheetmetal work, we must teach the two together, if not in the same room at the same time, at least so closely related that they will be associated inseparably in the minds of the pupils.

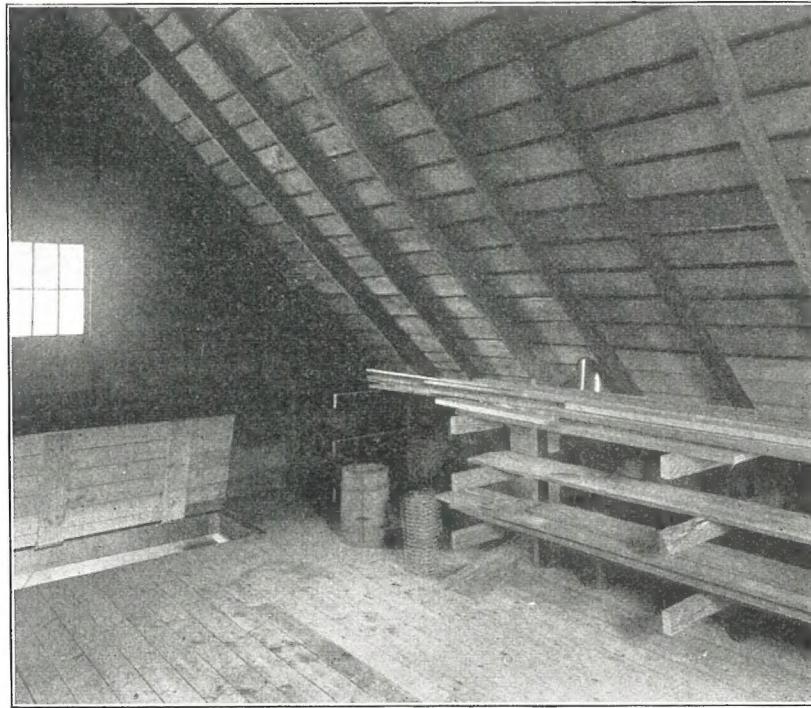
Many schoolmen feel that the schools have done their full duty when they have taught the pupils to use their thinking and reasoning faculties, and that the entire time and energy of the school should be devoted to this task. Their conception (or misconception) of an education is clear thinking with indifferent doing, while the work of the world requires both clear thinking and efficient doing. Consequently, their schools have stopped

short of giving the pupils the working skill which is required in the business and industrial world. When the pupils have entered upon wage earning, all their energies have been turned to the acquisition of manual dexterity and skill, which has precluded for some time the use of their mental faculties in the planning and working out of the more intricate problems of their work.

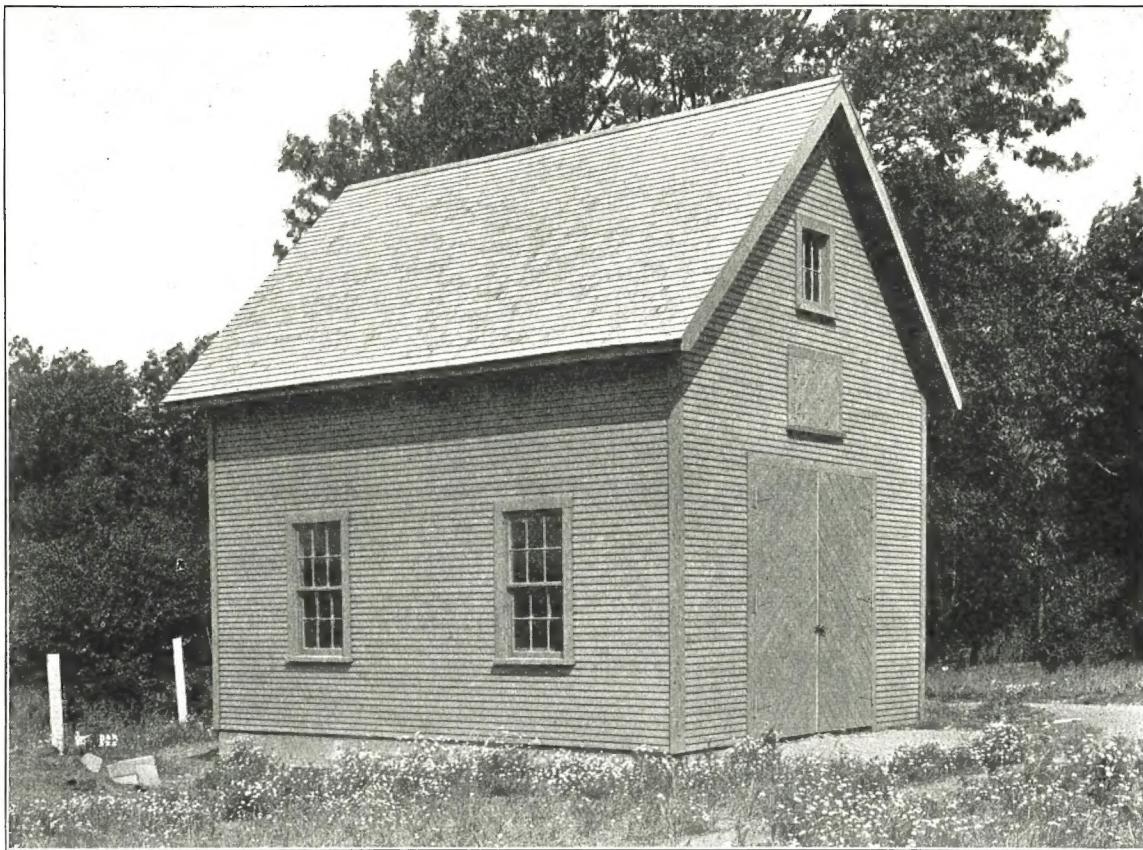
The amount of time to be spent in school on the principles underlying a process is determined largely by the amount of time available and the imminence of the need for the use of specific skill or ability. If we were certain that at the end of two hours, a certain person who could not swim, would be thrown into the water, we would consider it very unwise for that person to devote his two hours to a study of the history of swimming and the principles governing floating and locomotion in the water. The greatest need for that person is

the acquisition of the ability to swim, by the time he is compelled to use it.

The boys and girls who attend a vocational school have an *immediate* need for some training which will enable them to earn the necessities of life. Figuratively speaking, they are going to be thrown into the sea of industry, which is beyond their depth, and if they are not taught how to swim, they will sink helplessly in its depths. They must be given something to sell—the ability to render some service in exchange for which, society will furnish them at least the necessities of life. If as Spencer has said, the purpose of education is to enable the individual to live completely, the first essential in education is to provide the individual with the ability to earn food, shelter, and clothing, for without these, complete living is impossible. This may seem materialistic, but let those who doubt it, try to live completely without them.



Attic, Farm Workshop at Milwaukee County School of Agriculture.



The Farm Workshop at the Milwaukee County School of Agriculture.

A FARM WORKSHOP

Louis M. Roehl, Milwaukee County School of Agriculture, Wauwatosa, Wis.



HE rural people are manifesting an increasing interest in industrial work and, as a result, are incorporating such handwork in their schools as space, funds and time permit. They are realizing, more and more, that the hand and eye training, which the industrial work affords, interests the boys, is of great value to them on the farm, and has a tendency to keep them in school for a longer period of time. This interest they know continues and grows. The boys are stimulated with a desire to apply their training to the making of farm articles at home, for both the home and farm use. The home articles may be such as wash bench, ironing board or window screen and the farm articles may be such as a hay rack, fruit ladder, singletree, eveners or other similar articles necessary in the practice of agriculture.

Rural industrial work naturally concerns itself with farm projects, the smaller of which constitutes the construction work of the schoolroom. The first lessons consist of learning the names of tools, of handling them and the woodworking tool operations. Simple problems are first chosen, and as the student acquires skill in the application of tool operations, he is given more difficult projects. The projects constructed at school necessarily

must be small, therefore the larger articles must be constructed at home. There should be a strong co-operation between the school and home work. The teachers should so supervise the home work that school credit can be given.

To construct these larger projects at home the boy must either borrow the school tools or have some tools at home and a place at which to work. Every farm should have a shop in which the construction of farm necessities and repair work can be done.

A farm shop, suitable for the average farm, has been built by the students at our school, the drawings and pictures of which are shown here. Great interest was shown in the planning and construction of it, on the part of the boys. It was designed to meet all the needs without an unnecessary outlay of either material or equipment. The tools which make up the equipment, are those necessary for the ordinary farm and for keeping the equipment of such a farm in order. The individual must use good judgment in selecting standard tools, the size and weight of which suit his particular needs and the conditions which his particular farm presents.

The building is 16 feet by 20 feet with 12 foot posts. The joists for the attic are placed for a 9 foot ceiling. The roof is half pitch, providing a large attic for storage purposes. The door is 8 feet by 8 feet which is a convenient size for admitting all kinds of farm machin-

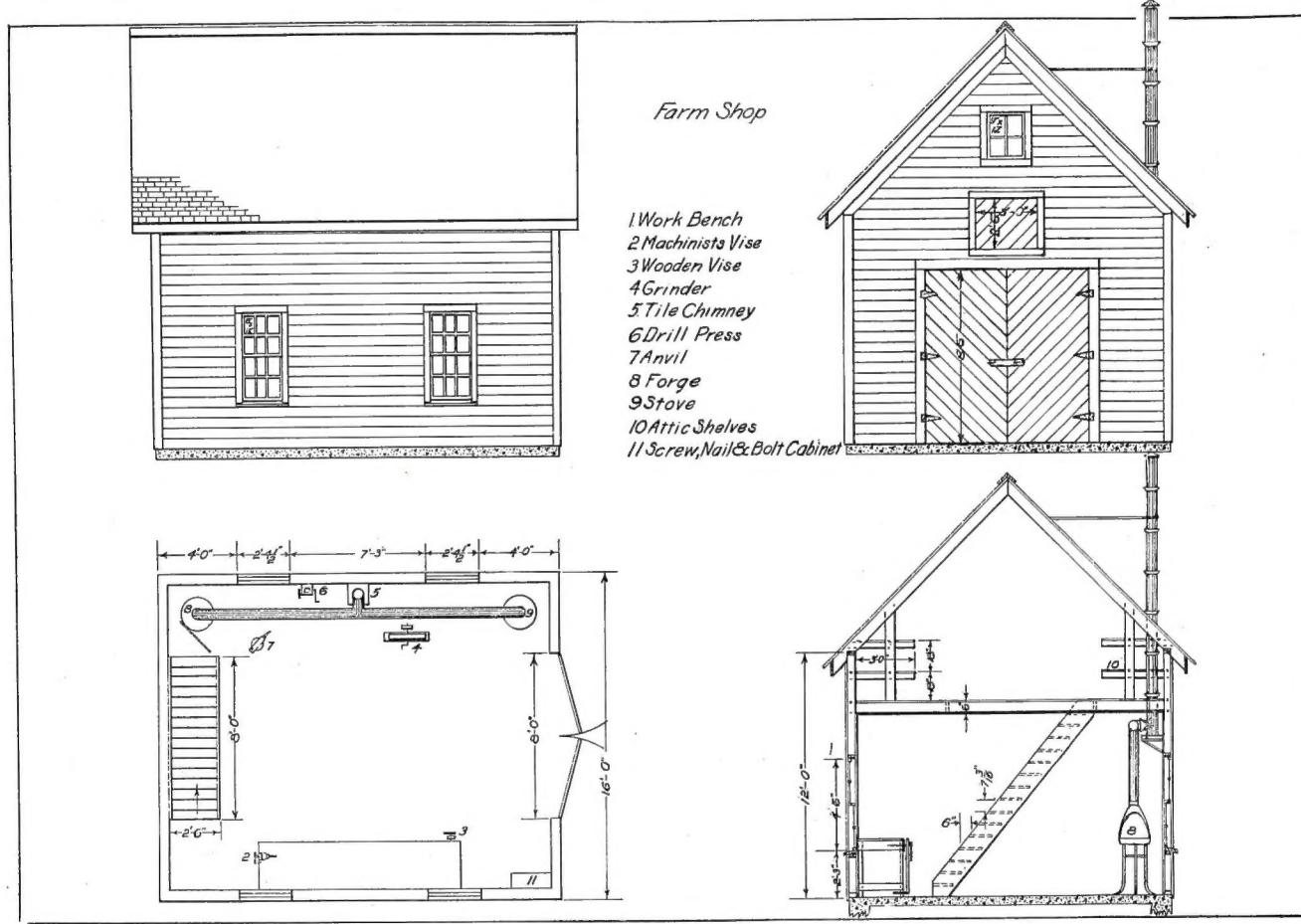
ery and equipment. Large projects such as wagon boxes, hayracks, ladders, gates, etc., may be constructed in the shop. Two large windows have been placed at each side of the shop and one small one in each gable for the attic. A door 2 feet 6 inches by 3 feet has been built, above the main door, to admit lumber into the attic. A stock of lumber should always be kept on hand on the attic shelves.

On one side, between the windows, a work bench 2 feet 6 inches wide, 10 feet long and 2 feet 10 inches high is built. The front end of the bench is equipped with a homemade wooden vise which has an iron bench screw. At the other end is fastened a metal vise. The top of the bench is made of three 2 inch by 10 inch planks, the front one of which is maple, the others pine.

The remaining wall space is sufficient for conveniently hanging all the farm tools. A silhouette of each is painted on the wall in its proper place so that when a tool is missing one can easily detect what it is. In a corner is a waste box over which hangs a broom.

At the rear of the room is a stairway leading into the attic over which is a trap door. This door is manipulated by a rope hung over a pulley. This permits closing off the attic from the rest of the building in cold weather.

The farm shop properly equipped for work to be done in it, in conjunction with the manual training in the school, is a step toward making the farm and home life more inviting to the youth on the farm.



The woodworking tools are arranged on the wall over the work bench, within easy reach of the workman at the bench.

On the other side, at the rear corner, stand the forge and anvil. The forging tools hang on either the anvil block, or on the rack on the wall near the forge. On the same side, in the other corner, stands the stove. The smoke pipes from the stove and forge, lead to the chimney which is constructed of sewer tile and stands on a bracket. The chimney extends higher than the ridge of the building and is braced by rods. The drill press is fastened to the wall near the forge, and next to this is the grinder.

Lumber for Farm Shop.

- 9 pc. 2"x 4"-16' Hemlock or Y Pine.
- 5 pc. 2"x 4"-20' Hemlock or Y Pine.
- 3 pc. 2"x 4"-18' Hemlock or Y Pine.
- 26 pc. 2"x 4"-14' Hemlock or Y Pine.
- 38 pc. 2"x 4"-12' Hemlock or Y Pine.
- 11 pc. 2"x 6"-16' No. 1 White Pine.
- 3 pc. 2"x 8"-14' No. 1 White Pine.
- 4 pc. 1"x12"-10' No. 1 White Pine.
- 4 pc. 1"x12"-14' No. 1 White Pine.
- 10 pc. 1"x 6"-12' No. 1 White Pine.
- 10 pc. 1"x 6"-14' No. 1 White Pine.
- 5 pc. 1"x 6"-10' No. 1 White Pine.
- 7 pc. 1"x 4"-12' No. 1 White Pine.
- 14 pc. 1"x 4"-10' No. 1 White Pine.
- 22 pc. 1"x10"-10' No. 1 White Pine.
- 3 pc. 1"x 8"-14' No. 1 White Pine.

1160 ft. No. 1 White pine drop siding.



Corner in Workshop. Note Forge and Tools.

1585 ft. No. 1 White pine matched fencing 6".

500 ft. Hemlock roof boards.

6000 * A * Shingles.

Hardware for Farm Shop.

12 lbs. 20 d Nails.

5 lbs. 10 d Nails.

60 lbs. 8 d Nails.

20 lbs. 3 d Shingle Nails.

6 12" Extra Heavy "T" Hinges.

2 8" Heavy "T" Hinges.

2 6" Strap Hinges.

12 Window Spring Bolts.

1 6" Hook with Staple.

1 Barn Door Latch 7" long with Padlock Hasps.

1 Padlock.

18 1/2"x6" Carriage Bolts with Washers.

Lumber for Work Bench for Farm Shop.

1 pc. 2"x10"—10' Maple.

2 pc. 2"x10"—10' Select white pine.

1 pc. 2"x 4"—16' White Pine.

3 pc. 1"x10"—10' White Pine No. 1.

1 pc. 2"x 6"—10' White Pine No. 1.

1 pc. 1"x 6"—16' White Pine No. 1.

1 pc. 2" x 8"—2' 8" Maple.

1 pc. 2" x 4"—3' Maple.

1 pc. 1/2"x 8"—12' White Pine.

1 pc. 1" x10"—2' Maple.

Carpentry Tools for Farm Shop.

1	26" Cross Cut saw	.....	\$1.10
1	26" Rip Saw	.....	1.10
1	Jack plane—14" with 2" cutter	.....	1.80
1	Carpenters' draw knife	.....	.55
1	Marking gauge	.....	.15
1	8" Try Square	.....	.25
1	Mallet	.....	.22
1	Saw Set	.....	.80
1	Set of Auger Bits, 4/16" to 16/16" inclusive	.....	4.70
1	Rachet Brace	.....	1.50
2	Screwdrivers, 1 large, 1 small	.....	.72
1	Countersink	.....	.20
1	Steel rafter framing square	.....	1.00
1	Pair Pliers	.....	.70
1	10" Flat file	.....	.15
1	8" Triangular file	.....	.12
1	6" Slim tapered triangular file	.....	.10
1	12" Half round wood file	.....	.32
1	Pair 8" winged dividers	.....	.55
1	8" Oblong carborundum oil stove	.....	.85



Framing the Farm Shop.



Shingling the Farm Shop.

1 16-oz. Straight claw hammer.....	.50	1 Copperized Oiler .....	.15
1 24" Carpenter's level .....	.90	1 14" Pipe Wrench .....	.75
1 Nail set .....	.05		
1 Putty knife .....	.15		
4 Socket firmer chisels— $\frac{1}{4}$ ", $\frac{1}{2}$ ", 1", $1\frac{1}{2}$ "	1.40		\$46.96
1 2-lb. 2-oz. Bench hatchet.....	.60		
1 Myers Famous Lock Stitch, Sewing Awl with skein of thread and 1 doz. needles and 1 ball wax.....	.75		
1 2-ft. four-fold boxwood rule.....	.25		
	\$21.48		
Blacksmithing Tools for Farm Shop.			
Farmer's Anvil—70-lb., cast iron body, steel face.....	\$5.00		
Farmer's Forge	6.00		
Blacksmith's Hand Hammer—1-lb. 10-oz.....	.44		
Machinist's Hammer, 1-lb. 8-oz.....	.37		
1 Straight Lipped $\frac{1}{4}$ " opening, 18" length black- smith's tongs .....	.40		
1 Bolt Tongs, $\frac{3}{8}$ " to $\frac{1}{2}$ ", 20" length.....	.50		
1 Pair Fluted Jaw Tongs for $\frac{1}{4}$ " to $\frac{5}{16}$ " iron, 18".....	.50		
1 Steel Square, 12"x8".....	.50		
1 Hardie to fit Farmer's Anvil.....	.35		
1 Bonney's Farmer's Vise.....	.310		
1 No. 1 Silver's Blacksmith's Drill.....	.560		
1 Set Cleveland Twist Drill Bits, $\frac{1}{8}$ " to 1"x16th (Shank to fit No. 1 Drill).....	.425		
1 10-lb. Blacksmith's Cross Pein Sledge.....	.60		
1 Top Fuller $\frac{1}{2}$ " to $\frac{9}{16}$ " with handle.....	.35		
1 Bottom Fuller $\frac{1}{2}$ " to $\frac{9}{16}$ " with handle.....	.40		
1 Square Flatter $1\frac{1}{2}$ " face with handle.....	.15		
1 Set Hammer 1" Sq. Face with handle.....	.30		
1 Cold Cutter $1\frac{3}{8}$ " face with handle.....	.50		
1 Hot Cutter $1\frac{3}{8}$ " face with handle.....	.40		
1 No. 9 Star Hack Saw Frame with 1 doz. blades (12" frame and blades).....	1.20		
1 Agricultural Wrench $2\frac{3}{8}$ " opening.....	.60		
1 Always ready alligator wrench, 7" length.....	.80		
1 5-lb. box cherry heat welding compound.....	.40		
1 Spring Belt punch four tube.....	.75		
1 Scratch Awl .....	.10		
1 Grinder with one coarse and one medium dimo grit wheel	8.50		
1 Set of Stocks and Dies.....	4.00		
Farm Tools to be Stored in Farm Shop.			
Crowbar, 10-lb.		\$0.40	
Corn Hook .....		.25	
Scythe .....		.75	
Snath .....		.70	
Ax, 4-lb. (handled) .....		.80	
Ironed Neckyoke .....		.55	
Singletree .....		.45	
Evener .....		.65	
1-lb. Frazer Axle Grease.....		.10	
Axle Oil .....		.22	
Handled Cast Post Maul, Speery's Pattern, 16-lb.....		.65	
1 Mill and Warehouse Broom.....		.43	
Wire-stretcher, Benedict's Improved Jumbo.....		.65	
Log Chain, $\frac{5}{16}$ " diam., 12 ft. length.....		1.00	
Post Hole Digger (Atlas).....		1.00	
Mattock .....		.50	
One Man Cross Cut Saw (Champion Tooth), 4-ft.....		1.60	
Hay Fork, 4-ft. Handle.....		.45	
D. Handle Spade .....		.60	
Garden Rake .....		.55	
Clover Rake .....		.50	
1-lb. High Grade Cup Grease.....		.20	
Cant Hook (4-ft. handle)		1.15	
Heavy Bush Scythe .....		.75	
Bush Snath .....		.75	
Carborundum Scythe Stone .....		.18	
Buck Saw .....		.50	
Watering Pot, 16-quart.....		.38	
Hay Knife (Weymouth) .....		.70	
Spading Fork .....		.65	
Manure Fork, 4-ft. Handle.....		.55	
Harness Oil, 1 pint.....		.25	
Ensilage Fork		1.15	
Sanderson Grain Scoop .....		.90	
Potato and Vegetable Scoop		1.10	
1 Bolster Spring, 1,000-lb. XXX.....		1.85	
1 Garden Hoe.....		.55	
		\$24.41	



The Work Bench and Tools in the Shop.

Art in Its Relation to National Growth

Frank Alvah Parsons, President of the New York School of Fine and Applied Arts, New York City



Ob be fruitful of any concrete results a limited discussion of this subject must impose certain elemental and fundamental premises to which, for the time being at least, those concerned can all subscribe. The meaning of art is the first of these.

Art, more than any other term in the English tongue, has been misunderstood, juggled with and misapplied, until a clear conception of its real meaning is well nigh impossible. Art, so far as it relates to our subject today, "The Plastic Arts," is a quality, and, like other qualities, is subject to certain limitations and qualifications depending upon the problem with which it is associated. Art is that quality which results from certain combinations of color and form which are in perfect harmony with the idea which they express and with each other in the unit which they represent. These combinations of color and form, which I shall, for want of a better term, call "Significant Forms," occur in man's work in materials only when they are first present as a mental state. The habitual condition of consciousness in which a state of harmony in these combinations is present, is an artistic state and a person possessing this state of mind is said to be artistic. Art is first of all then a state of mind and may be cultivated in exactly the same manner as any other state of mind, and by the same educational processes.

Man in all stages of his development instinctively craves beauty, which is the natural stimulant for the universal aesthetic sense. He also, by the fundamental laws of life, strives to express beauty. Naturally he attempts this in those fields in which his most intense interests lie. This is the reason for the art expression in Greek Temples, Gothic Cathedrals, Renaissance Palaces, Fresco Paintings, Colonial Homes and modern touring cars. The amount of concentrated interest present and the kind of interest determines the quality and kind of object. There is one art only, but as many manifestations of it as there are life interests, and the emphasis of its excellence at any time is directed at the particular thing most strongly focal in human consciousness. This is true both of the nation and of the individual and is the reason for the "periods in art."

It may be well to discuss for the moment some of the things which art is not, that a clearer vision of what art is may appear.

First, art is not nature. Every element in nature's plan has its place in material, texture, form and color in relation to the stupendous whole of which it is a part. In its place, undisturbed by man, each element in nature plays its part in the sublime beauty of the universe. Remove an element from its natural environment, adjust it with unrelated materials, forms and colors, make it do the work for which it was not intended, and it is no longer nature, art, nor has it beauty.

The supreme effort of the past one hundred years in this country, seems to have been directed against art, by a gigantic effort to compel students to copy or represent nature and in every known material from the hair wreath to the bent iron animal kingdom. Instead of adapting nature's suggestions in suitable form and color, expressed in suitable material, nature's characteristics have been made to play the part of false representations in every field. Art is not nature nor the representation of it. It is creation and should be used as the expression of creative ideas adapting nature's suggestions, like suggestions from other sources, for particular use under the laws of decorative treatment only.

A more intimate intercourse with Italy and France in the last quarter of a century has aroused an abnormal interest (born largely of curiosity) in the antique. For this reason, and in this way, our mental attitude has become one of labels, dates, and costs, instead of one which can react normally to that which is beautiful, be it old or new. Art again is not *antiquity, curiosity, nor cost*. It is quality and I must possess that quality personally if I am to react to it in objects which possess it.

Still again, Art is not necessarily associated with the painted picture. The insistent belief on the part of painters, teachers and the public in general that an art exhibit is necessarily a picture exhibit, has led finally to making the picture idea an essential element in all decorative art. This mistake is responsible for the seemingly impossible situations that exist when one sees roses in the carpet "as natural as life," lilies and grapes upon the walls, withering and wilting before one's eyes, and fish, fowl and beast "hand painted" on china which should arouse in the human mind visions of the Aquarium, the Natural History Museum and the primeval forest, but never, never can this touch the aesthetic sense. Never can it be Art, nor can it by any chance be a help to the appreciation of what art really might be.

Education is the adjustment of the individual to the time and the environment in which he finds himself. Times change. Every change brings new needs. From these new demands are made and new creations appear. Art remains the same quality and must be an element of the objects in which we now have interest to make its true appeal to modern minds or to be of lasting service in modern life. It is the business of education to meet new demands and now the demand is for better food, better homes, better furnishings, better clothes, better implements, and better advertising signs. In short, it is our business to adjust man to his activities and his conditions as we find them now. This is certainly as true of art education as it is of any other field of work, and the problem must be solved in the same scientific, sensible and sympathetic way as any other efficient educative work. We must consider the individual, the principles governing the subject, and the

subject matter or materials we will use in bringing the subject to the mind of the individual himself.

The power of environment, as an educative factor, is too well recognized by this body to need comment, and yet may I ask you to realize with clearer emphasis than ever before its essential bearing on the subject of art education? A national art means art in the national consciousness. The quality of the national consciousness can be no finer than the average of its individual elements. The solution of the problem of the nation's art is answered in the quality of the intimate environment in which the individuals of the nation live. This environment in which we are born, grew up and learn to feel at home, will find its reflection in the consciousness of all. Think not for an instant that a school which owns a few good pictures, a home housing an onyx statue of the Venus di Milo, a city with a sculptured fountain or two, or even a museum of art objects can take the place of this art environment. Any effect they might have had is quickly neutralized by the house, the shop, the uncanny park, the bill-board and the moving picture show, each a monument of supreme ugliness in itself.

Clearly there are some quite definite things to teach even in art. First let us teach what art is; that it is a quality whose two elements are use and beauty; that perfect fitness to use is the fundamental consideration in so-called "Applied and Industrial Arts" where personal ideas of beauty and sentimental impulses must not be allowed to destroy one's intellectual judgment of what is fit.

Second, we must not confuse the art quality with its visible language of expression, which is such combinations of color and form as will excite the aesthetic sense. This language, like other symbols of expression, is subject to specific laws of structure and ornament both in choice and arrangement and, to become operative, must be taught scientifically as well as intuitively.

Third, we must teach that the use of an object is generally the reason for its being; that we may not when decorating it, interfere with its use quality, but rather by decorating it we call attention to its structural and use qualities by the application of a decoration to it.

Further, we should let it be known that we are decorating the object to satisfy our natural desire for beauty, being certain that our standard of what is beautiful is clearly conceived, that is, that we have a conscious concept of what beauty is. We must bear in mind, too, that decoration exists to make more beautiful the thing which it decorates and not to exploit itself. When this unity and sequence is not observed between the object and its decoration, the decorative idea itself is thereby destroyed.

Fourth, manual skill and the knowledge of processes, too, must not be called art; but recognized as essential elements of good technical expression only. It is not that the importance of them should be minimized; but they should not be mistaken for what they are not. Much of the so-called correlated work in Art and Manual Training, the Arts and Crafts, and Domestic Art, recognizes the necessity of their technical facts only and believes this to be art. This work is chiefly notable for its absence of the Art quality.

Finally, we must teach the facts and principles by which and thru which the symbols of this language (color and form) are expressible in such "significant forms" as shall stimulate the section of the aesthetic sense. In the use of these symbols first insist on expression of fact and truth, then on the individual imaginative use of them. This is teaching art, and its habitual practice is training in good taste or art appreciation. The growth of a nation is the sum of the growths of the individuals who make it. The directions in which the activities of a nation manifest themselves are the same as those in which the activities of the individuals express themselves.

Viewed in the simplest possible manner we must choose between a development which has for its avowed object the growth and expansion of a people whose sole aim is material power, wealth and national material aggrandizement; or we must accept the truth that man has a spiritual nature which is the master, not the servant, of the material world. Whichever of these views is taken, art is a mighty factor in the realization of what is called a normal national life.

It has often been said, "We can have art here in this country. If we can't produce it, we can buy it." Unfortunately art is one of the things one cannot applique into consciousness; nor is a rudimentary aesthetic sense any more capable of digesting and assimilating a subtle aesthetic concept than is the most elementary digestive system able to accept and use a ten-course French Table d'Hôte dinner. Because of this, even if we accept purely the material viewpoint, the nation can ill afford to ignore the money value of an art education which is a natural element of our industrial life.

In this art quality lies the difference in value of most of our important materials. On the other hand, if we accept the view that man's material expression is influenced by his mental or spiritual self, the argument for a fuller knowledge, a higher standard and a more profound respect for art becomes clearly of vital importance to us, both as individuals and as a nation. Art is truth, or harmony, expressed. In whatever way or in whatever material it is expressed, it is a constant reminder of the eternal fitness of things and is a silent urge to better thinking and better living.

Quite apart, however, from the normal problems of national evolution, is the special one with which we are grappling today. With the civilized world engaged in a life and death struggle for political and commercial supremacy, this nation is confronted with the most stupendous commercial problem in its history. Our social and industrial fabric is rent asunder by the forces of materialism as they grapple with man's inherent demand for standards of beauty and spiritual ideals. We must, in the near future, not only supply ourselves with textiles, furniture, carpets, wall papers, clothes and other necessities furnished in Europe; but we shall in many instances, be asked to supply South America and even Europe itself with these same things. In matters of natural resources, mechanical skill, and physical energy, we are ready. In matters of art, we are crude, uncertain and, worst of all, in many instances, satisfied. Until

there is a changed attitude as to what art is, as to its proper values as an element in life, we cannot compete even in matters of commercial rivalry, for art is as essential to man's perfect satisfaction as any material quality can be.

The solution of not only this special problem, but of the problem of "Art in its relation to our national growth," lies, in a frank acknowledgment and a clear understanding of what problems present themselves, and in what state of preparedness or unpreparedness we find ourselves to meet these problems. The solution demands an awakening to a keener sense of the power and natural

function of art, as it relates to man's normal activities and to the educational system of which we are a part. We must cancel dead traditions about our teaching and approach the subject in the same fair-minded manner that all other subjects are approached. We must denounce the idea that art is a fad or a frill and accept it as man's natural, normal, necessary inheritance. We must educate more art teachers and less drawing teachers, keeping in mind that art is a quality of consciousness, that understanding of it, appreciation for it, and personal reaction to it by a nation means individual possession of that quality in personal consciousness.



Furniture Exhibit of the Philippine Schools at the San Francisco Fair.

binding it can be disposed of by allowing the edge to be slightly out of the straight line, and trimming it after it is dry. Obviously, in the full skin, this resource is cut off and great skill is required, especially in handling pig and seal skin, to prevent an unsightly curtain-like looping of the leather between bands. There is no rule; it is done by doing it, and by him who can. A very clever pupil of mine once said that he should never be able to sell a book; he would be too proud of the good ones and too ashamed of the poor ones to part with any.

The leather is pushed firmly along with the palm of the hand, taking care to keep it even so that it does not turn over the edge much farther at one point than at another, and taking great pains also to see that it sticks on the edges. The fitting of the leather over the corners is one of the most difficult and delicate parts of the process. When it is perfectly done the juncture does not show and is tooled over, in the decorated book, like a plain piece of leather. The process, however, is not completed at one time. At the time of covering the leather is pulled over the corner, and with a bone folder pushed well over and inside the corners, a sixteenth of an inch perhaps—as far as it will go, but well over, so that no opening of the leather will come on the edge. Then, still with the folder, the leather is made to lie flat on the board and the slack gathered into one mass, projected above a straight line, this line terminating at a point well within the corner.

With a pair of scissors this bunch of superfluous leather is now cut off, not so close as to run any risk of its gaping at any point; on the contrary, something to spare is left and the bit to spare is temporarily disposed of by pushing one side neatly under the other and leaving it thus to dry with the rest of the book over night. When dry the book is opened in the manner already described, laid open on the board in two levels and the corners completed by cutting the two overlapped faces of leather thru in a bevel, exactly bisecting the right-angle, so that they will fit each other with the slight overlapping of the bevel and still be perfectly smooth. The extra bits are now pulled out and a little

fresh paste is inserted. The beveling and fitting of the corners is a very nice process and requires a good deal of deftness and a good deal of practice. A gaping corner is very unworkmanlike. Should it occur, as it sometimes does even to the practiced, the inlay is a last resort. Inlaying (literally on-laying) will be treated of in the fourth and last article on "Finishing."

In Fig 15, in the September number of the MAGAZINE is shown a piece of leather, pared for covering, a book, cover open, and a book covered and untrimmed.

The last process before "Finishing" or "Tooling" is "crushing." This is done in two ways, either by heat or moisture—never both together! I was taught to crush by slightly moistening the leather of the filled and trimmed book with a sponge, placing the single cover between two japanned or nickelated plates sufficiently thick not to bend, then placing the cover and plates on a pile of binders' boards, with the cover centered under the screw of the large standing press, (Fig. 17) and screwing the press down under hard pressure with a lever. The cover was allowed to remain a few minutes thus, and was then taken out. If the crushing was uneven the process was repeated, sometimes several times, moving the cover so that the central pressure came above the part least crushed, or even putting bits of thickish paper, torn with "feathered" edges, as near as possible to the size and shape of the part to be crushed, between the plate and the board; *never* next the book. The method I now use is that of heating the plates instead of moistening the leather. Otherwise the process is the same. The plates should just have stopped hissing when moistened; if they are too hot the consequences are very dire. Either the leather is burned or sticks badly to the cover and if it sticks too fast, the surface of the leather is disfigured in pulling it off. When both covers are crushed (observe, never at the same time, or the book would be crushed to a ruin between them) the back is polished with a polishing iron (for which purpose it is confined in a hand press (Fig. 18) between two wedge-shaped leather-lined boards). Our book is now ready to be decorated, and let us hope it deserves to be.

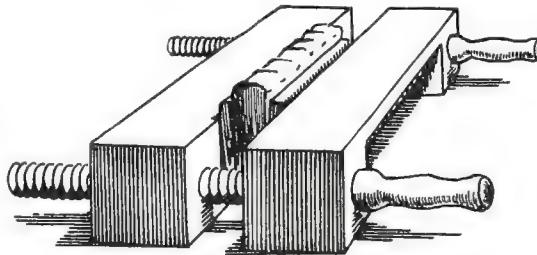


Fig. 18.

To What Extent Can We Justify the Use of Machinery in Our School Shops, on the Basis of Its Efficiency?

Examples and Experiments

A. H. Edgerton, Balboa Heights, Canal Zone



HERE are growing evidences that our best school workshops are seriously attempting to do their part in preparing boys most efficiently for service. Perhaps the most noticeable step in this direction, has been the decided change in the purpose of the work offered. Today, it is generally realized that the content and organization of the work involved in having boys make things merely to keep them busy, cannot begin to compare with the larger values found in doing work which is really worth while. As a result, the school workshop is being thought of more and more as a small factory, typifying to a reasonable degree, the principles, processes, methods, and machines of the industry which it represents.

Such increasing confidence is not without reason, for when either a course of work is being organized or equipment is to be installed, it is carefully selected so that it will, as far as is deemed practicable, typify the actual conditions in the industries. It is obvious that no small importance should be attached to either of

these selections, if our boys are to have a true understanding of industrial production.

This tendency to emphasize practical applications and the reproduction of work having a commercial value, offers the boy a valuable insight into the workings of our industries. It should not be inferred from this, that it would be either advisable or desirable to have every piece made in the school shop, a commercial product; on the contrary, it is often a saving of time and material to master new processes with an abstract piece of work, before applying it to a finished product. What it does mean, however, is that there will come a time in the shop course when the average boy will have sufficiently mastered the important principles and processes, involving the correct uses of hand tools; and, when this time does come, he should be given an understanding of the larger productive-side of the work. After he once realizes the true relationship between his jobs in the school shop and those in the commercial shops, he will more clearly see the importance of eliminating unnecessary slowness and excessive waste in his work.

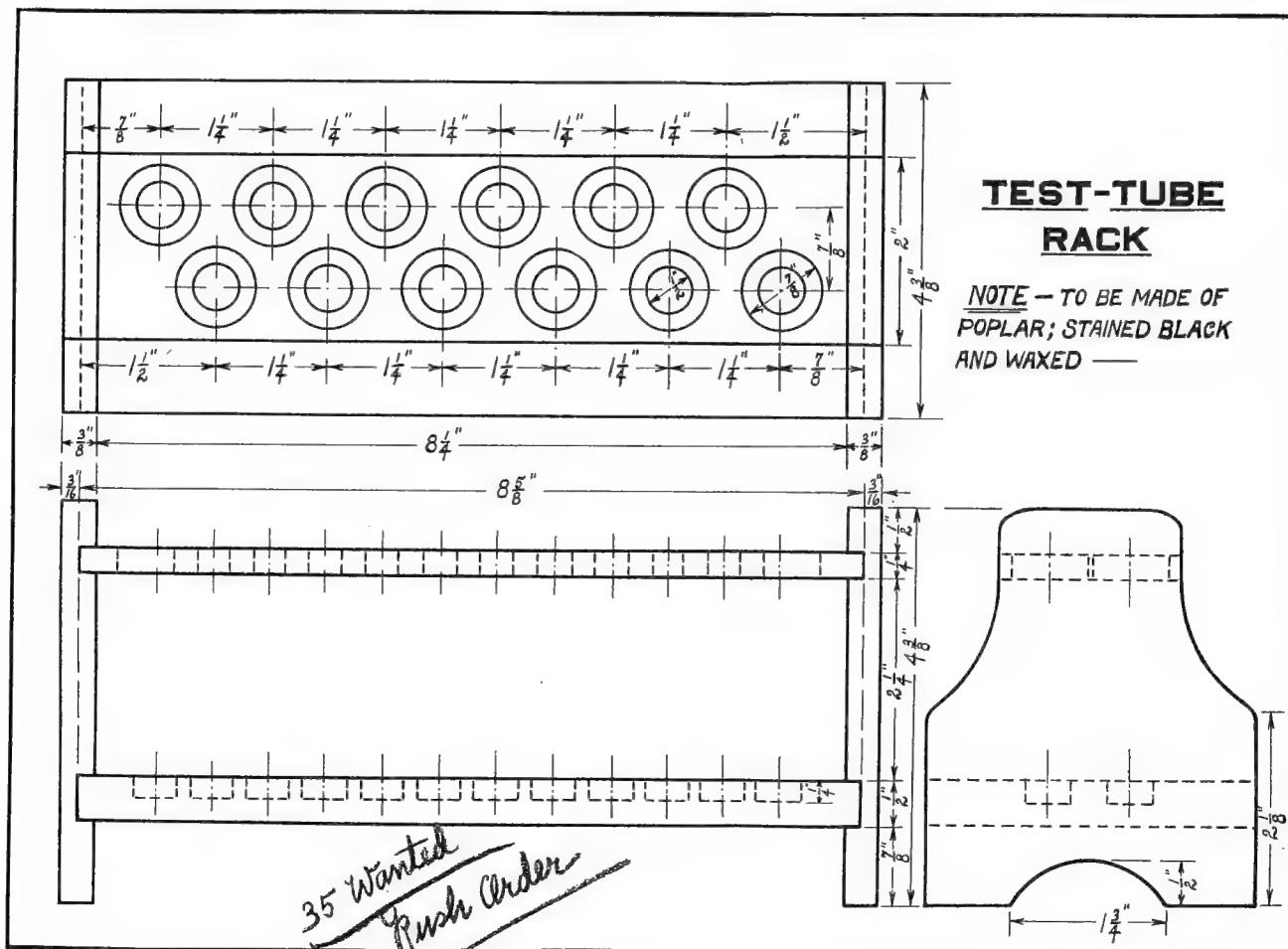


Fig. I. Working Drawing for Test-Tube Rack.

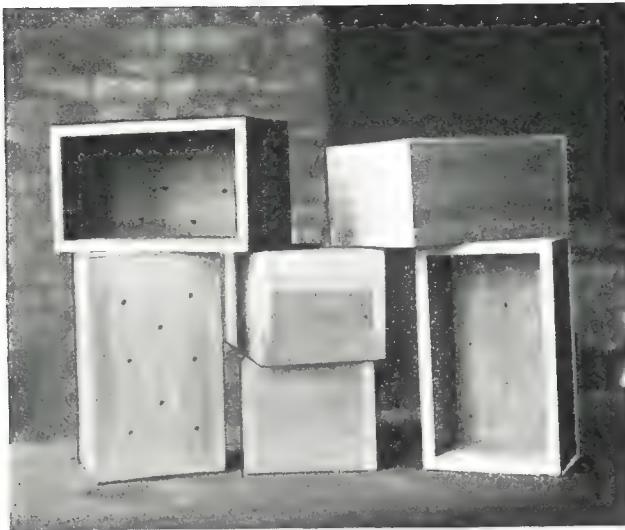


Figure III. Third set of boxes—made by boys who used the circular saw in making their second boxes.

An Example of How a Workshop May Give Boys An Insight Into Productive Industry, Even Tho It Has a Limited Amount of Equipment.

The following illustration shows how two boys were given an insight into the productive-side of industry, thru realizing the necessity of eliminating needless movements and waste of material in connection with their work. A rush order for 35 test-tube racks, to be made according to the specifications shown in Fig. I, was received from our laboratory of science. This order was turned over to two high-school boys, who had had one year's experience in the woodworking shop, with the understanding that they manufacture the 35 racks at the lowest possible figure.

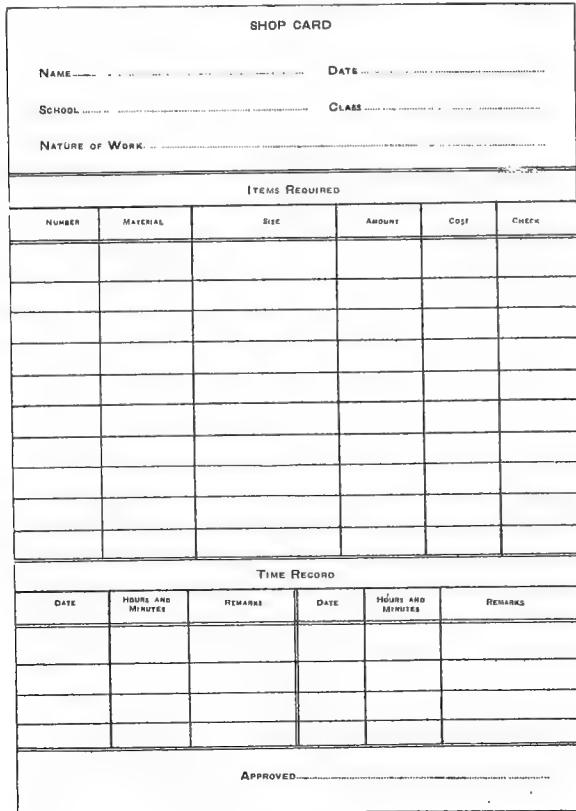


Fig. II.

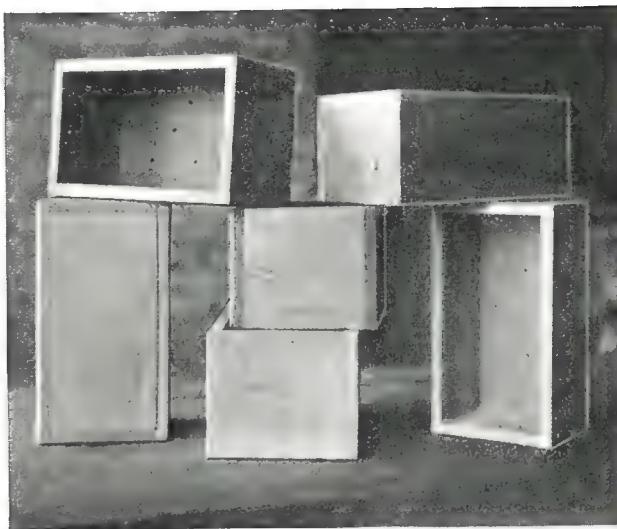


Fig. IV. Third set of boxes—made by boys who had used hand tools only thruout the experiment.

After talking over the construction of the racks and deciding how they were to be made, the boys began planning in preparation for the actual doing of the work. At this point, they realized that the three following important questions had to be considered:

1. How may we make these with the least possible waste in material?
2. Just how much accuracy do the various operations of this job require?
3. How may we do this work in order that all unnecessary slowness may be eliminated?

They first decided upon the operations to be used, how they were to be performed, and then the order in which these operations were to come. Labor-saving machinery was used throughout the problem, the work being made as nearly typical of factory methods as our equipment would permit. Whenever our machinery would not allow us to do certain operations in the most practical way, it was explained to the boys how the work would be taken up in the factory and that we were making our operations as practical as was possible with our limited amount of machinery. Most of the information which was given them was not final, but put to them in such a way that they found it necessary to think out the suggestions. When the boys had decided upon the machines which would best perform the operations, they then figured out how these were to be set up in order that they might get just the amount of accuracy their job required.

After finishing the planning, the boys knew exactly what was to be done from the beginning to the end, consequently they lost no time in setting up their machines and getting results. Each boy did all of the operations on at least fifteen of the racks, so that he might fully understand how his planning worked out in practice. A shop card, as shown in Fig. II, was used by each boy in keeping an exact account of the material and time used in making the 35 test-tube racks. It was quite evident that the boys were much interested in the problem, as they put good thought back of the work and carried out their ideas in a systematic and businesslike manner.

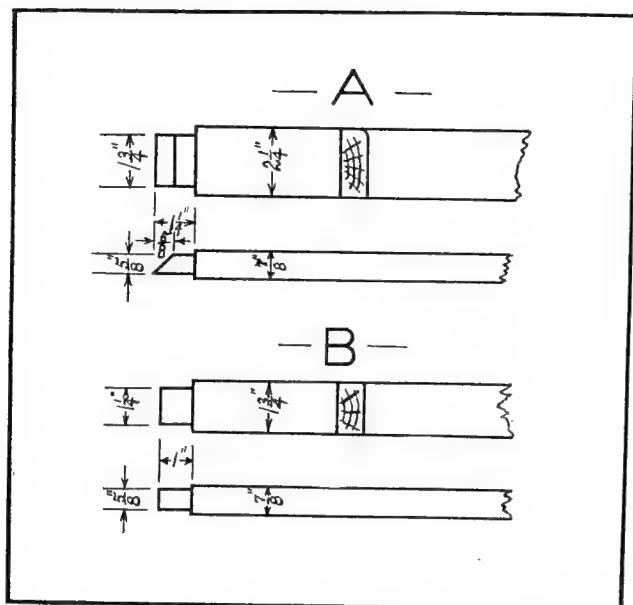


Fig. V. The top and bottom rails, as required for all stools, are shown at A and B, respectively.

A Danger in Teaching Machine Work in the School Shop.

If the school shop is to be most successful in its purpose, it must go even further in its emphasis; it must not be contented to emphasize principles, processes, and methods typical of those found in the industry, but it must also aim to be as efficient as are the best organized and regulated manufactories. For several years past, the most competent manufacturers have had definite standards for testing the methods and practices of their business organizations. On the other hand, "Do we know to what extent our schools are justified in typifying the equipment and work of the industries?" It may also be reasonably asked, "Are we assuming that the manufacturer is capable of choosing the machinery to be used by our growing boys, who, in most cases, have not even chosen their life work?"

The latter had become a live question to me, as I felt certain that a school in which I had especial interest, was allowing its boys to use woodworking machinery too freely before they had acquired sufficient skill in the use of hand tools. As a result, these boys were unconsciously allowed to think and act in terms of machinery, when the proper uses of hand tools would have been of more value to them, for some time at least. The fact that such a danger existed was much in evidence somewhat later, as shown by reports from the employers of nine of these boys, who had worked during the summer vacation.

This experience caused me to realize, as never before, that altho it had been considered important to have certain woodworking machines in our schools, we lacked a means by which to measure the actual value the boys might derive from their use.

Experimenting with the Uses of Hand Tools and Machinery.

An order for fifty boxes, in which seeds were to be planted, was received from the biological laboratory. While deciding upon the class to fill this order, the fact that each boy would have to make at least three boxes,

suggested an opportunity to experiment with the relation of the use of hand tools to the use of machinery.

There were twelve boys in the class, each of whom had had considerable experience with hand tools. After discussing the construction of the boxes at the first lesson, each boy made a sketch including all of the necessary dimensions. He was then ready to get out the stock, to lay out the work, and make his box with the use of hand tools only.

When the first set of boxes was finished, the class was divided into two groups, each group being composed of boys of equal ability, as nearly as I could judge. The six boys in one group made their boxes with hand tools, just as they had made their first ones. The other six used the circular saw in cutting out their stock nearly to size, allowing only enough on each dimension to plane off the saw-marks. As might be expected the boxes which the first group made were somewhat better than their first ones; while those made by the second group, with the help of the circular saw, were nearly accurate.

In making the third set of boxes, all of the boys used hand tools. Upon examining these boxes, it was found that the boys who had had the help of the circular saw in making their second boxes, had done more accurate work the third time (Fig. III) than the boys who had used only hand tools thruout the experiment. (Fig. IV.) An account of the time which each boy had spent upon his last box, showed that this group had also used less time in making its set. The six boys in this group finished their respective boxes in 348 minutes, while the other group took 426 minutes to complete theirs. This made a difference of 78 minutes between the groups, or an average of 13 minutes for each boy.

No great accuracy is claimed for the data on the results of this experiment, as it is necessarily erroneous to a degree measured by the difference between the abilities of the two groups. However, since the boys of each group were of approximately the same ability, the decided difference of 13 minutes for each boy much more than makes up for any differences which might have existed between the groups at the beginning of the experiment.

The outcome of this experiment seems to indicate that the boys who made their second boxes mechanically accurate with the circular saw, were given an image of accuracy, which they used as a standard in making their next boxes. Having definitely in mind the thing for which they were working, no time was lost in their efforts to attain the desired results. The boys who had used hand tools only, were undoubtedly given an incentive to do better work; however, they evidently lacked that same idea of accuracy by which to measure their work.

Second Experiment With the Relative Uses of Hand Tools and Machinery.

The question that naturally grew from the above experiment, was whether or not these boys who had used the circular saw in making their second boxes, could have derived an equal idea of accuracy from merely

seeing boxes like those they had made with the help of this machine.

Over a year later an opportunity was offered for me to experiment further. Nineteen eighth-grade boys had begun making their first mortise and tenon joints, the purpose of this exercise being to prepare them for the making of simple pieces of furniture, involving the use of a blind mortise and tenon joint. When the practice pieces were completed, I suggested that each boy make a woven-top or leather-top stool, provided that he had a use for one. Sixteen of the nineteen boys chose to make this piece of furniture. They were allowed a certain amount of originality in designing these, but all were required to make the top and bottom rails of the dimensions shown in Fig. V.

As each boy finished his working drawing, he sawed out his pieces and planed them to size. After they had made tenons on both ends of two of the top rails (Fig. IV-A), and the four corresponding mortises in the legs with the use of hand tools only, I divided them into two groups. Each group had boys of practically the same ability. The eight in the first group continued to make tenons for the other two top rails and also the necessary mortises, all with hand tools, just as they had made the first two. The other eight were allowed to use the circular saw in cutting the tenons and the wood lathe, fitted with a jig, to bore out the mortises. Consequently, the joints which the first group made were noticeably better than those they had made before, while those made by the second group, with time-saving machinery, were almost perfect.

Before beginning the bottom rails, the group which had used only hand tools was divided into two groups of four boys each. Arrangements were then made so that one of these groups compared their hand-made joints with the machine-made ones; in so doing, it was carefully pointed out where and why their work was not as accurate as the other group.

This time, all of the boys in the class used hand tools in making mortise and tenon joints for two bot-

tom rails, Fig V-B. After the joints were finished, I examined them closely, and again found that the boys who had used labor-saving machinery in making the preceding four joints, had made their last four decidedly better than the other boys, who had used only hand tools from the beginning. They had also occupied less time in completing them. We were able to keep an account of the actual amount of time which each spent upon his last four joints. The first group made their respective joints in 992 minutes, as compared with 784 minutes used by the other eight, making a total difference of 208 minutes between the groups, or an average difference of 26 minutes for each boy. It was interesting to note that the four boys who examined the machine-made joints, made their bottom-rail joints somewhat better than the other four in that group, but they used practically the same amount of time in finishing them.

Having the results of the first experiment in mind, the group to use hand tools only was given every benefit of a doubt when the boys were being divided for this experiment. Considering this fact and the results of the experiment, I concluded that all of the class had acquired sufficient skill in the making of mortise and tenon joints by hand, at the time when it was divided into two groups. Eight of them were kept working with hand tools beyond that point. As a result of this, they were prevented from getting that idea of accuracy which helped the other boys to do better work and likewise to save time by eliminating needless movements. Examples of well made pieces always inspire better workmanship, but this is not to be substituted for that experience which can only be had from actually using labor-saving machinery, thus becoming familiar with the machine-processes and machine-methods.

From these results, it would seem that machinery may contribute other values to the school shopwork, aside from giving the boys an understanding of the productive-side of industry. It is my sincere wish that others may find time to perform similar experiments, in order that our industrial teachers may gain a higher degree of efficiency in their work.



Baskets Designed and Made by Miss Mary Blanchard, Bellefonte, Pa.

EVENING SHORT UNIT COURSES IN THE WORCESTER GIRLS' TRADE SCHOOL

Helen R. Hildreth, Director Girls' Trade School, Worcester, Mass.



EVENING Classes were begun at the Worcester Girls' Trade School October 7, 1912. Courses were offered in Plain Sewing, Shirt Waists, Skirts, Skirts and Waists, Millinery and Power Machine Operating. The last was a trade class, the members of which were already working in some part of the trade and wanted to advance within it. The other classes were for those wanting to learn to make their own clothes. Three hundred and ninety-two women were enrolled during the winter and many of them were so pleased with their success that they registered for the work of the following winter.

In September, 1913, the registration was over 500, many more than the classrooms at the Trade School could accommodate. The previous spring, a class had been conducted at Dartmouth Street School, for the Civic League of Union Hill, and this suggested a way of taking care of the large number of applicants. In five schools, already open for academic evening classes, certain rooms were placed at the disposal of the Trade School at a nominal expense, and here women in the neighborhood congregated and followed the same courses as were going on at the Trade School Building.

The 26 weeks of evening work were divided into three terms, ten weeks before Christmas and two terms of eight weeks each after Christmas. Work was offered in the following:

1. Millinery.

2. Plain Sewing (with the following garments to be made):

- (1) Petticoat.
- (2) Corset cover.
- (3) Dressing sack.

3. Waists:

- (1) Tailored shirt waist.
- (2) Lingerie.
- (3) Fancy.

4. One Piece Dress:

- (1) Cotton material.
- (2) Woolen material.
- (3) Fancy material.

These courses offered an increase in the difficulty of each problem and made a gradual advance from a simple garment to one more complex.

Three sets of women attended: one group of classes Monday nights, a second group Tuesday and Thursday nights and a third one on Wednesday and Friday nights. One night a week was not satisfactory, being too infrequent, and was discontinued at the end of the year. Over eight hundred women were registered during the winter, besides a waiting list which was never exhausted.

The popularity of the classes and willingness to master fundamental processes instead of making a dress or waist for immediate wear, made it evident that detailed courses could be given with more careful classification according to ability and experience. This was done by making the scheme cover 24 weeks and dividing

SCHEDULE OF CLASSES

Weeks	Plain Sewing	Plain Skirt	Unlined Waists	Fancy Waist	Plain Dress	Adv'd Dress	Chil'n Clothing	Mill'y
Sept. 28	2	2	2	2	2	2	2 I	2
Oct. 5	4	4	4	4	4	4	2	4 I
Oct. 12	6 I	6 I	6 I	6	6	6	4 II	6
Oct. 19	8	8	8	8 I	8 I	8	6	8
Oct. 26	10	10	10	10	10	10	2 III	2
Nov. 2	12	12	12	12	12	12 I	4 III	4 II
Nov. 9	2	2	2	14	14	14	2	6
Nov. 16	4	4	4	16	16	16	4 IV	8
Nov. 23	6 II	6 II	6 II	2	2	18	6	
Nov. 30	8	8	8	4	4	20	2	
Dec. 7	10	10	10	6	6	22	4 V	
Dec. 14	12	12	12	8	8	24	6	
Jan. 4	2	2	2	10 II	10 II	2	2 I	
Jan. 11	4	4	4	12	12	4	2	
Jan. 18	6 III	6 III	6 III	14	14	6	4 II	
Jan. 25	8	8	8	16	16	8	6	
Feb. 1	10	10	10	2	2	10	2 III	2
Feb. 8	12	12	12	4	4	12 II	4 III	
Feb. 15	2	2	2	6	6	14	2	6
Feb. 22	4	4	4	8	8	16	4 IV	8
Mar. 1	6 IV	6 IV	6 IV	10 III	10 III	18	6	2
Mar. 8	8	8	8	12	12	20	2	4 IV
Mar. 15	10	10	10	14	14	22	4 V	6
Mar. 22	12	12	12	16	16	24	6	8

them into six, eight and twelve-week units according to the amount of work to be assigned to each unit.

To carry out this new plan successfully, close supervision is necessary. A Supervisor for the Evening Classes was appointed and under her care better work has been done, and more complete records kept.

In August, 1914, the following schedule of the coming classes was sent each applicant of the previous year:

The millinery classes had dropped off during the mid-winter months each year, so in this scheme they were offered only in the first and last eight weeks of the 24 weeks of evening work.

It was a great satisfaction to have many applicants choose to enter the Plain Sewing, waist or skirt classes. Two-thirds of the new pupils asked for the elementary work and then progressed to the next in difficulty until a good foundation was laid for competent work in advanced courses.

So few registered for the Classes in Children's Clothing that they were not given. Evidently mothers think that if they can make their own clothes they can make the little garments, not realizing that a child's dress is not a miniature of the adult's but has a style all its own and needs careful working out.

The women often asked to repeat a unit; having learned to make a plain cotton skirt a pupil wanted to fix the principles by making a woolen skirt or a more complicated cotton one, or having made one waist she wanted to have further practice on a second one. So, in arranging the units for 1915-16, classes in advanced skirts and advanced waists have been added to meet this demand and make the course more complete.

Also, a new unit in waist and skirt draping will be offered for those who understand finishing and simple cutting and fitting. This is planned especially to satisfy a demand from Trade School Graduates to enable them to round out their training now that they are mature enough to understand more advanced work.

The following is the schedule of classes as arranged for next winter:

WORCESTER GIRLS' TRADE SCHOOL.

Evening Classes for 1915-1916.

1. *Plain sewing for those who know nothing of sewing; 6 weeks or 12 lessons.*
Class I begins Sept. 27, ends Nov. 5. Straight Apron, dressing Sack.
Class II begins Nov. 8, ends Dec. 17. Corset Cover, Night Gown.
Class III begins Jan. 3, ends Feb. 11. Straight Apron, Dressing Sack.
Class IV begins Feb. 14, ends Mar. 24. Corset Cover, Night Gown.
2. *Plain skirt of cotton material; 6 weeks or 12 lessons.*
Class I begins Sept. 27, ends Nov. 5.
Class II begins Nov. 8, ends Dec. 17.
Class III begins Jan. 3, ends Feb. 11.
Class IV begins Feb. 14, ends Mar. 24.
3. *Advanced skirt of woolen material; 6 weeks or 12 lessons.*
Class I begins Sept. 27, ends Nov. 5.
Class II begins Nov. 8, ends Dec. 17.
Class III begins Jan. 3, ends Feb. 11.
Class IV begins Feb. 14, ends Mar. 24.

4. *Plain unlined waist of cotton material; 6 weeks or 12 lessons.*
Class I begins Sept. 27, ends Nov. 5.
Class II begins Nov. 8, ends Dec. 17.
Class III begins Jan. 3, ends Feb. 11.
Class IV begins Feb. 14, ends Mar. 24.
5. *Advanced waist for those competent; 6 weeks or 12 lessons.*
Class I begins Sept. 27, ends Nov. 5.
Class II begins Nov. 8, ends Dec. 17.
Class III begins Jan. 3, ends Feb. 11.
Class IV begins Feb. 14, ends Mar. 24.
6. *Plain one-piece dress of cotton material; 8 weeks or 16 lessons.*
Class I begins Sept. 27, ends Nov. 19.
Class II begins Nov. 22, ends Jan. 28.
Class III begins Jan. 31, ends Mar. 24.
7. *Advanced dressmaking using woolen or fancy material; 12 weeks or 24 lessons.*
Class I begins Sept. 27, ends Dec. 17.
Class II begins Jan. 3, ends Mar. 24.
8. *Waist and skirt draping; 12 weeks or 24 lessons.*
Class I begins Sept. 27, ends Dec. 17.
Class II begins Jan. 3, ends Mar. 24.
9. *Millinery, 4 weeks or 8 lessons; advanced work for former pupils.*
Class I, Trimming felt hat, begins Sept. 27, ends Oct. 22.
Class II, Making winter hat, begins Oct. 25, ends Nov. 19.
Class III, Trimming spring hat, begins Jan. 31, ends Feb. 25.
Class IV, Making summer hat, begins Feb. 28, ends Mar. 24.
10. *Machine Practice.*
A special teacher will help all pupils who do not know how to use the sewing machine.

The success of these short units depends upon the skill with which the teacher plans each individual lesson.

The evening teachers, with three exceptions, are drawn from the dressmakers and milliners employed in shops or who have their own private customers. They have had no training in teaching but understand their trade thoroly. This thoro understanding of dressmaking or millinery does not guarantee that they can teach women to make their own clothes and hats. In fact the skilled tradeswoman is so long past the elementary fundamentals of her trade that she often does not realize that the thing which she does unconsciously is a great puzzle to the novice and must be carefully approached step by step, if the pupil is to become an independent worker. This last should be the main object of all instruction and unless the woman is able to duplicate at home the articles made in class, the teaching has not been a success.

To assist in this, monthly teachers' meetings, with voluntary attendance, have been held at which the different units have been discussed, the processes involved and the methods to be used in their development. The following points show how the models are analyzed. Points to be taken up in the

Apron. (Skirt principles.)

1. Suitability of material.
2. Idea of breadths in a skirt.
3. Review seams; beginning use of sewing machine.
4. Hems—
 - a. Narrow with selvedge.
 - b. Wide across goods as at bottom of skirt.

5. Gathering—
 - a. Divide apron in half.
 - b. Two rows of gathering.
 - c. Adjusting gathers.
6. Putting on band—

Two ways, by hand or by machine.
7. Two halves must be alike as in a skirt.

NOTE—This is the first model and presupposes ignorance on the part of the pupil. *Skirt principles* are made much of, for the apron has little value in itself except as it prepares for future problems.

Dressing Sack. (Waist principles.)

1. Suitability of material.
2. Suitability of pattern—the first to be used—(Set in sleeve required).
3. Bust measure taken.
4. Use of pattern—understanding directions, pieces, alterations and cutting.
5. Fitting.
6. Alterations.
7. Seams according to material—
 - a. Basted with full side towards worker.
 - b. French seam in soft or wash material.
 - c. Open and overcast in heavy material.
 - d. All seams turned alike, either toward front or back, at both ends.
8. Curved hem at bottom of garment, with fullness at the top held in.
9. Straight facing to finish neck and down front as a band.
10. Sleeve, bound arm hole.

NOTE—This model is to teach the *principles of waist making* preparatory to the waists taken up in following units.

The foundation thus laid in the "plain" courses will be used as the basis of classification another year, and no pupil will be admitted to advanced work who has not finished this preliminary work satisfactorily.

The teachers discuss the content of all units so that those teaching more advanced classes know what should have been covered in the elementary work; and the teachers of beginners know what will come in the later units.

In some cases the topics for each lesson were planned at teachers' meetings and followed by all the teachers having charge of a given unit. For instance, in Millinery the three teachers followed this plan for the second unit—making a winter hat—and it worked out unusually well. The eight lessons were as follows:

1. Cutting circles in paper, then in buckram: wiring the edge and binding it; covering the disk with canton flannel, thus getting the whole process of making and covering a hat brim.

2. Discussion of winter shapes, suitability to wearer, difficulty in covering. Decision about shape to be bought.

3, 4. Covering hat with canton flannel, first cutting a paper pattern and estimating the amount of velvet needed later.

5, 6, 7. Removing canton flannel and substituting velvet, using the flannel pattern to cut the velvet.

8. Finishing hat and trimming.

There were three classes of fifteen each, both sets of lessons, making 90 in all, and each hat was a success. The women were all so pleased with the skill they had acquired, and talked so much about it that others hearing of their enthusiasm have applied for admission to similar classes.

On the reverse of the application card is a scheme to take care of the attendance of each pupil as well as the record of her work.

Name.....		Began Date	Finished Date	Report	Class.....Year.....			
COURSES.	Date Ad.				Left.....	ATTENDANCE RECORD.		
1. Plain Sewing Apron						Date	Date	Date
Plain Dressing Sack								
Plain Corset Cover								
Plain Night Gown								
2. Plain Cotton Skirt								
3. Unlined Cotton Waist								
4. Fancy Waist								
5. One-Piece Dress, Cotton								
One-Piece Dress, Woolen								
One-Piece Dress, Silk								
6. Dressmaking								
7. Children's Clothing								
8. Millinery								
9. Power Operating								

Pupils' Attendance Card, Worcester Girls' Trade School.

Each unit opens on a definite day, so the date begun is always known. When an article is finished at the end of the unit, it is brought to the supervisor for inspection and marking. If in an "outside center" the teacher in charge must report upon the work as completed. In this way the "office" is the final judge of both teacher and pupil, and a high standard can be maintained for both. The small amount of inferior work shown has been a great encouragement. When to this is added the fact that over 700 were enrolled last winter and the majority of them remained to complete the unit entered, the encouragement is not unfounded.

The short unit—the elementary ones for only six weeks—seems such a little time that a woman is often induced to enter the one within her ability and from it she soon passes to one more difficult but for which she has been prepared. She finds she must and can do the work for herself and the desire for a dress for immediate wear is superseded by the satisfaction of accomplishment, even if the result is something very simple. Several successive "stints" of short duration are much easier of accomplishments than a long one which seems to be never done; the landings in a long stairway are a great relief.

The State Board of Education has set a standard of 75 per cent attendance for approval; last winter our average attendance for 93 nights was 87.4 per cent, and some classes frequently attained 100 per cent. Whenever it fell, it was due to storms, church meetings, or holidays. Most other absences were due to illness and frequently this fact was telephoned during the day so that the absence would be excused. The women seemed to realize that each lesson was something which could not be missed if they got all that the unit held for them. After two unexcused absences a card was sent notifying the absentee that unless heard from by the next lesson, she would be dropped; this almost always brought a prompt response. The work of the unit ceased with the time set and if the pupil could not give more time in another unit she was "honorably discharged." Since only those actually employed during the day are admitted to these classes, it sometimes happens that an

over ambitious woman finds the night work too trying to continue.

I began the short unit courses with some doubt in my mind as to their feasibility. Where there are as many pupils as we have had in Worcester, so that many divisions can be made—only fifteen to a teacher, the different lines of work can be easily established. Where there are few pupils of greatly varying ability the problem is much more difficult. We encountered this in the outside centers and met it by dividing the pupils into fewer units. In a group of thirty women we found about half were ready for simple dresses, having had instruction previously. One teacher, a dressmaker, had charge of them. Another teacher, experienced in teaching, took care of the other half who were mostly beginners. In this group were two units, plain sewing and plain skirts, and each unit was kept by itself. This increased the work of the teacher but did not affect the content of the unit or method of instruction.

The Advantages of the "Short Unit Courses."

The advantages of the Short Unit Courses are as follows:

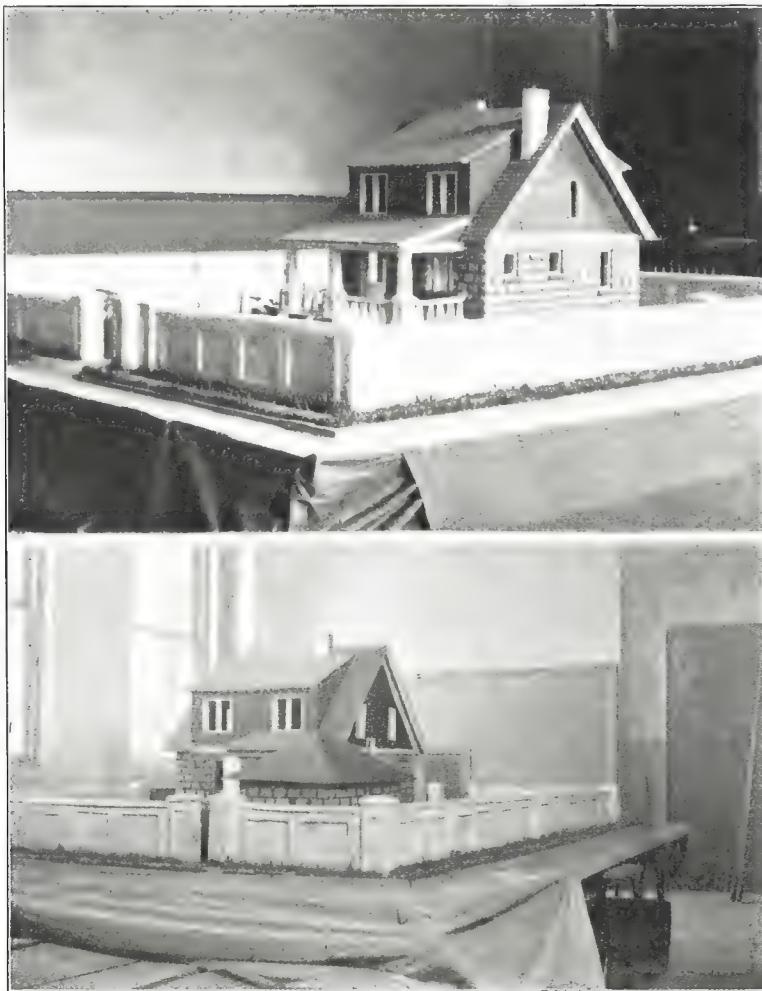
1. The work is thoro—certain definite points are involved in each unit and the pupil has time to master each one in turn.

2. The school is able to establish correct standards in each unit and the intensive work helps to maintain them.

3. A woman can choose a unit which offers the work which she desires and when it is completed she can drop out if she can give no more time. Usually she continues in another unit.

4. With a limited number of lessons, regular attendance is an absolute necessity in order to complete the work during the unit. The average attendance of the evening school, 1914-15, has been over 87 per cent.

After two years' experience in conducting the "Short Units," I feel they are the most effective way to develop evening work. Their full efficiency will be reached when a corps of teachers has been prepared to conduct them intelligently and the women of the community have been convinced that ability to do independent, constructive work is of more value than a new dress.



These photographs present the front and rear views of a concrete house and wall constructed by a few eighth grade boys in Homestead, Pa., public schools working under the direction of Mr. Lawrence James. The boys were repeating the grade and had completed the projects usually given in the shop. The work proved intensely interesting as well as educational.

ORGANIZATION IN THE TEACHING OF MANUAL AND INDUSTRIAL ARTS

Fred. D. Crawshaw, Madison, Wis.



HE preceding articles in this series have dealt with three of the four general divisions into which *organization* in the teaching of industrial work has been divided. The last three articles gave examples of teaching Material Organization for which the supervisor is responsible.

With this article, we begin a study of the last division into which the series is divided, viz., Organization of an Administrative Type. This article deals with the problem of deve'oping a part of the annual budget for a department of manual and industrial arts—that part which has to do with *Supplies*.

A well organized institution which handles a large number of supplies, and adds materially to its equipment from year to year, makes an annual budget. This is no more nor less than a plan of expenditures for the ensuing or the next succeeding year.

To use an illustration with an example which should be universal, we may consider the budget for a home. Certain definite and constant expenses are current with each year. Some of these are the items for clothes, eatables, rent or interest on loan, entertainment, education, etc. The frugal housewife and husband will agree that upon the basis of expenses for one year those of the next should be a certain amount. Thus the total expenses and the relation of expenses is determined before the expenses for a year are incurred. This is making a budget.

One of the important and necessary known quantities in making a budget is the available means or annual income. Consequently, in making a budget for a department of industrial arts perhaps the first requirement is a knowledge of the appropriation to be made by the Board of Education. However, this appropriation should be made largely in accordance with the demands of the department. These demands are determined by ascertaining the exact expenses of the last year and the changes for the succeeding year. Thus the supervisor will, from his annual report and inventory, figure up the total annual expense of operating his department, consider the changes he will make in all branches and activities, and arrive at a point where he can accurately figure the budget for the next year.

The three principal divisions of a budget in manual and industrial arts are: supplies, equipment and teachers. To these three items should be added one for contingencies such as office expenses, printing, drayage, etc., (unless these constant expenses are taken care of in one of the three items named); or about 10 per cent of the budget should be allowed for the annually recurrent items which will be sure to be discovered from month to month. For example, if \$600 is allowed for supplies; \$250 for equipment; and \$1150 for a teacher, \$200 more, or a total of \$2200 rather than \$2000, should be regarded as the total budget. In the budget which will be explained later, the actual appropriation is \$910.40,

whereas \$1000 is recommended for the reason given above.

In the syllabus three plans of using a course of study are suggested, any one of which may be the one which will determine the course to be followed in developing that portion of a budget given over to supplies. Let us consider the first, viz.: the plan of a "fixed" course of study, in which the pattern and size of each project is known.

It is apparent that here we have only one unknown quantity, that of the number of pupils who will take a certain course, and possibly, also, the amount of supplies they will waste. This item can be determined with considerable accuracy, as the experience of the past will be the experience of the future. Likewise the number of pupils can be fairly estimated by direct calculation and some speculation as follows:

The number of pupils finishing the sixth grade this year will be the number entering the seventh grade next year, less those who drop out, and plus those who come in from other districts. This last item is the one upon which one must speculate, and with some accuracy, by consulting the school records of the past.

Having the total number of children to provide for in any one grade and the definite course of study to be given, the amount of stock is easily determined. For example, in woodworking, the supervisor may do as Supervisor C. F. Perry of Milwaukee has done, pass out to each instructor a set of blueprints showing the exact pattern and size of each pupil-project, and the order in which they should be made. This instructor, at the conclusion of the school year, multiplies the number of prospective pupils for the next year by the amount of stock in a particular project, and he knows at once the amount of lumber to requisition for this project in his center. Mr. Perry adds these corresponding items for different centers together and he has the amount of stock for a particular project for a year.

It is even possible to follow more closely the practice in a commercial plant where stock parts are used from year to year. The instructor needs only to say: "There will be a certain number of pupils in Grade 7B next year." This information gives the supervisor the necessary information to have bulk stock cut so that the exact number of pieces for any particular part or all parts of a particular project may be ready in the fall for all grades.

From a pupil point of view this plan is by no means the best. It formalizes a course to the limit. It eliminates all possibility of latitude of choice of projects by individual instructor or pupil. However, from the point of view of business economy it is perfection. It will be worth while to study the system of calculating supplies and of caring for them under this plan.

At some point in the city the supervisor will establish a central storeroom. Here, too, will be located

machinery to cut stock, such, for example, as power shears for paper, cardboard, and sheet metals and machines to cut up lumber and possibly forge and machine-shop stock. When all of the amounts of detailed sizes of material are known, an employe will cut and store all stock for delivery just before the opening of school.

The arrangement of the stockroom and the method of recording stock in it are interesting features of a well organized supply room. Needless to say each detailed part of every project has a definite place and all parts of a particular kind are kept together. In this particular the well organized stockroom of a factory serves as a good example. Large pigeon hole cases will be provided along the walls and thru the central portion of the supply room with just sufficient room between adjacent cases for passageways. At the entrance of the room is a guide sheet or "log" which directs the attendant to a particular case or part of the room where he will store or find stored all the material of a particular kind belonging to a particular project, or to be used for particular schools as the case may be. In case all parts of a particular project are stored together, then a sign on the pigeon holes will announce this fact and each pigeon hole will have stored in it all the parts A, B, or C, etc., belonging to the project in question. For each of these pigeon holes there will be an active inventory sheet and upon it will be recorded the number of pieces contained in the pigeon hole.

A similar pigeon hole system will be installed in each grade center, except that here the cases will provide only for the material to be used in the woodworking room, drafting room, clay room, etc., whereas at the central storage room provision must be made for all kinds of supplies.

During the summer and shortly before the opening of school the required amount of stock is delivered to each school building in the city. The duly authorized individual at each building signs a receipt for the stock received, and he in turn requires pupils to record the amount taken for their projects. The accompanying "Grade Center Stock Record" illustrates a common

GRADE CENTER STOCK RECORD.

	Shelf Stock							
	1	2	3	1	2	3	4	5
John Smith.....	1	1	1	1	1	1	1	1
		1		1				
Wm. Jones.....								

method of keeping the individual pupil record of stock used. It is very apparent that at any time a check may be made upon stock in a grade center depending upon

what is recorded as having been taken out for pupil project work; or a check may be made to ascertain what stock should be on hand as compared with the amount delivered and signed by the instructor or other individual in the building.

The Grade Center Stock Record illustrates a plan for recording the stock used by members of a graded class in woodworking who follow a course in which all projects are defined. At the top are the names of the projects, and at the left the names of all members of a particular class. Underneath the name of each project is found numbers, used to designate the parts of the project. Thus, in the case of the shelf, 1 may stand for the top; 2 for the back; and 3 for the brace. In the case of the stool, 1 may stand for the top; 2 for one end; and 3 for the other; while 4 and 5 each designate a side rail. From the record as shown, it will be seen that John Smith used one top piece, one back, and two braces. For the stool he used one of each part and an extra piece for one end and one rail, presumably to take the place of others which had been spoiled. By this record sheet an accurate account of all stock used by pupils is kept. The amount of extra stock used by any pupil may serve to determine the pupil's final grades as well as to make out an annual inventory.

Considerable detail has been used in describing the plan of estimating and caring for stock used in a well defined course for two reasons. First, it represents an organization which is typical for a large system in which good business management is necessary and for which careful consideration of expense is imperative. Second, it is easily adapted for either of the other two plans outlined in the syllabus.

The second plan, II, may be carried out in almost the same way as the one just described. In this plan the pupil is allowed to modify the pattern for a project, but the type of project in every case is fixed by the supervisor. He, therefore, has stock cut to maximum sizes and presumably left in sizes representing the gross stock for a project. The pupil, therefore, in designing his project calculates his detail sizes, to permit dividing the stock into the required parts. It might be true, of course, that each project part is cut to a maximum size. In this case the pupil has less opportunity to vary his design especially in the dimensions he will use for each part.

The plan suggested in III of the syllabus, provides for the delivery of stock, in bulk sizes, to the school centers. The amount of stock for each grade or class, in each center, is determined upon the basis of the amount used by a similar group in the preceding year, with allowance made for waste. Necessary allowance should be made also for a larger class than the estimate considers, due to those who may come into a school district during a summer vacation.

Bulk stock is classified and stored in the central storeroom, or delivered directly to the center building from the local yard or railroad station. In this case the instructor gives the supervisor an account of the supplies received and keeps, by means of pupil stock and job cards and also, by means of the active inventory sheets previously described, a strict account of all supplies used

from day to day. While the plans herein described for estimating and accounting for stock may be more appropriate for some kinds of supplies than others, it should be made clear that they are easily adapted for use in accounting for any particular kind of stock.

Probably the most cumbersome and difficult supplies to handle are those used in lower grade construction work. There are numerous classes of supplies which are bulky and difficult to weigh or measure. They are the most difficult to estimate also. A quantity of yarn is needed for a rug—just how much it is difficult to say because one rug will be packed or headed up better than another. In one, too, there will be more natural waste than in another and possibly, also, the rugs for a particular group of pupils will vary somewhat in size. Any one or all of these conditions may enter in to make the supply budget for lower grade manual arts more difficult to determine than almost any other.

It may be, also, that the complexity of the problem is increased by reason of the *kind* of lower grade manual arts taught. As was previously explained, there is a strong tendency to emphasize what is called the "expressional" type of work in the primary grades. The individual pupil is supposed to conceive of some way to represent with materials some mental image. He initiates the means so far as possible and naturally makes use of the most convenient material. Under these conditions it is almost impossible to estimate what materials to secure, and in what quantities. However, for this type of construction work, it is only fair to say that left-overs and scraps are generally utilized; and consequently, while not quite "any old thing" can be used, much that would otherwise be thrown away can be made use of in this expressional construction work, as well as could new material.

The accompanying "Method of Working Up a Budget for Supplies, Grades 1-8" is given to serve as an example of how such a budget may be planned.

Method of Working Up a Budget For Supplies, Grades 1-8.

Supervisor or Teacher Problem.

MATERIALS USED IN PARTICULAR GRADES.

Grades 1, 2 and 3—Clay, Yarn, and Paper.

Grade 3—cord also.

Grades 4 and 5—Paper, Wood, and Clay.

Grade 6—Wood, Metal, and Paper.

Grades 7 and 8—Wood, Metal, Paper, and Cement.

EMPHASIS UPON MATERIALS IN DIFFERENT GRADES: BASE 5.

Grade 1—Clay 2, Paper 2, Yarn 1.

Grade 2—Clay 1, Paper 2, Yarn 2.

Grade 3—Clay 1, Paper 1, Yarn 1, Cord 2.

Grade 4—Clay 1, Paper 2, Wood 2.

Grade 5—Clay 2, Paper 1, Wood 2.

Grade 6—Wood 3, Metal 1, Paper 1.

Grade 7—Wood 2, Metal 2, Paper $\frac{1}{2}$, Cement $\frac{1}{2}$.

Grade 8—Wood 2, Metal 2, Paper 0, Cement 1.

NOTE—Girls not provided for in Sewing and Cooking.

ANOTHER PLAN.

MATERIALS USED IN PARTICULAR GRADES.

Grade 1—Clay and Paper.

Grade 2—Clay and Yarn.

Grade 3—Paper and Cord.

Grade 4—Clay and Paper.

Grade 5—Clay and Paper.

Grade 6—Wood and Metal.

Grades 7 and 8—Wood and Metal.

Estimate of Projects: (Example)—

Grade 1—Small clay and paper objects. Clay not wasted.

Grade 2—Yarn Rugs, 6" x 9".

Grade 3—Cord hammocks, 7" x 5".

Grade 4—Paper boxes, etc. Clay tiles.

Grade 5—Same.

Grade 6—Heavy wood projects. Boxes, etc. Venetian iron and thin copper.

Grades 7 and 8—Furniture (small) and metal trays and bowls.

Data—

Eight grade schools.

Average in grade, 40.

Grades 6, 7, and 8—Boys and girls equal.

Cost *per pupil*, by grades. (Estimated on basis of expense during preceding year.)

Grade 1—12c.

Grade 2—15c.

Grade 3—15c.

Grade 4—20c.

Grade 5—20c.

Grade 6—60c.

Grade 7—75c.

Grade 8—75c.

Girls for 6, 7 and 8.

Sewing in Grades 6, 7, and 8.

Cooking in Grade 8.

Grade 6—13c.

Grade 7—30c.

Grade 8—40c (sewing) + \$1.10 (cooking) = \$1.50.

Computation—

School's Pupils

8	40	@ \$0.12 (for 1st grade).....	\$38.40
8	40	@ .15 (for 2d grade).....	48.00
8	40	@ .15 (for 3d grade).....	48.00
8	40	@ .20 (for 4th grade).....	64.00
8	40	@ .20 (for 5th grade).....	64.00
8	20	@ .60 (for 6th grade).....	96.00
8	20	@ .75 (for 7th grade).....	120.00
8	20	@ .75 (for 8th grade).....	120.00
8	20	@ .15 (for 6th grade).....	24.00
8	20	@ .30 (for 7th grade).....	48.00
8	20	@ 1.50 (for 8th grade).....	240.00

Total \$910.40

Say \$1,000.00 below High School, considering *no* fees from pupils.

From his experience in the schools during a year, the supervisor first determines upon the main and particular materials which will be used in certain grades. He next determines upon the emphasis that will be given to each material in each grade. He can do this quite accurately in the case of required individual problems; for all others he must be guided by past experience. In the illustration one-half as much yarn as paper or clay is to be used in the first grade. Equal amounts will be needed of paper and clay.

Having estimated the relation between quantities of materials the next step is to determine upon project sizes so far as possible, hence the suggestion under the heading: "Estimate of Projects."

Knowing the number of schools, and the average number of pupils in each grade in each school, and being able to calculate the price of material per pupil from the foregoing data, we have left only the numerical calculation given under the head of "computation."

Some such estimate of supplies should be made in any community where a rather well defined type of work

is to be carried on or where the projects can be calculated as to size, weight, etc. However, lower grade hand-work is known to cost about so much per pupil per year as the work is carried on in the average public school system. These average costs may be determined from the bibliography on supplies given in the supplementary

material. It is safe, therefore, unless particular data can be secured, to multiply the number of pupils in a grade by the average cost of construction material per pupil and thus secure a fair estimate of total cost per grade. A more scientific procedure should be followed where the data available makes it possible.

SEWING FOR THE GRADES

Annetta B. Cooper and Janet G. Cation, Normal, Ill.

(Third Article)

Course of Study for the Seventh Grade.

Problem.	Article.	Time.	Supplementary Problems.
Buttonhole Stitch	Doily	8 weeks	Tray cloth Guest towel
Chain stitch			
Outline stitch			
Patching	Towel	1 week	
Putting on binding	Spoon case	3 weeks	
Hemming			
Running			
Review of facing and stitches	Kimona	12 weeks	Princess slip
	Cooking		Flannelette gown
Review of previously learned stitches	uniform	12 weeks	
	Apron		
	Towel		
	Holder		

Problems for the Seventh Grade.

Cooking bag	Handkerchief case
Towel	Nightgown
Holder	Embroidered collar (Scrim)
Apron	Princess slip
Sleevelets	Corset cover
Tray cloth	Middy blouse
Dresser pad	Gingham dress
Kimona	

Doily.

Material:

Chain Stitch. Embroidery.

Round thread linen 9 inches by 9 inches.
Crewel needle number 8.
Padding cotton.
2 skeins D. M. C. number 25.
Drawing paper 9 inches by 9 inches.
Pencil.
Carbon paper.



Doily.

Method: Draw a circle on the paper with a diameter of 8 inches. Make a scallop and simple line design within it. Transfer it to the linen, being sure that the center of the design is on the center of the linen square.

Thread the needle with padding cotton and pad scallop using the chain stitch thru the center, and the outline stitch on each side.

Using the D. M. C., fasten the thread as for chain stitch. Hold the thread down with the left thumb and bring the needle up on the lower line on top of the thread. Take the next stitches from the upper line to the lower, always throwing the thread to the right and holding it down with the thumb in order that the loop may be formed which draws up to a purl along the edge.

In making a scallop the stitches should be kept at right angles to the scallops.

Material:

Hemmed Patch.

Towel.

Patch.

White thread number 60.

Needle number 8.

Method: If the towel is striped, cut the hole square, along the stripes. If plain, pull threads to get it square. Cut a patch two inches larger than the hole. Cut the corners back diagonally so that the edges may be turned under. Match the patch onto the larger piece, having the edges project evenly on all four sides. Baste the inside edge of the cloth to the patch. Hem, trim, and turn in the edges of the patch so that it extends $\frac{1}{2}$ inch from the hole when finished. Baste to the cloth and hem.

Spoon Case.

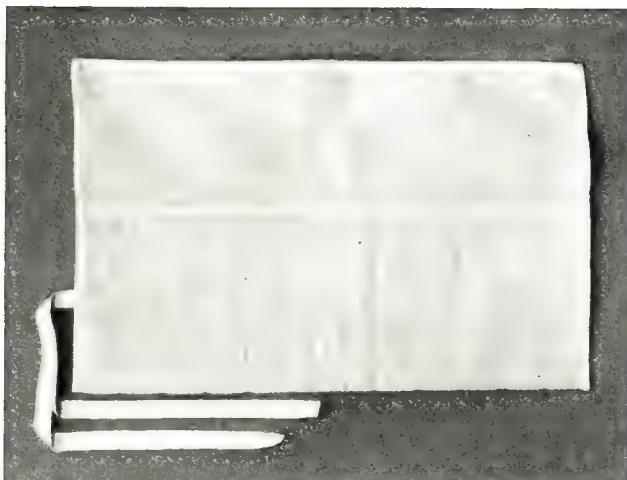
Running stitch. Binding. Review hemming.

Material:

Flannelette 18 inches by 18 inches.



Hemmed Patch.



Spoon Case.

Straight tape $2\frac{1}{2}$ yards.

Number 70 white thread.

Number 8 needle.

Measure.

Pins.

Method: Fold tape in center, press and open. Bind one edge by pinning the tape across it, placing half on each side of flannelette. Baste and sew with hemming stitch on each side.

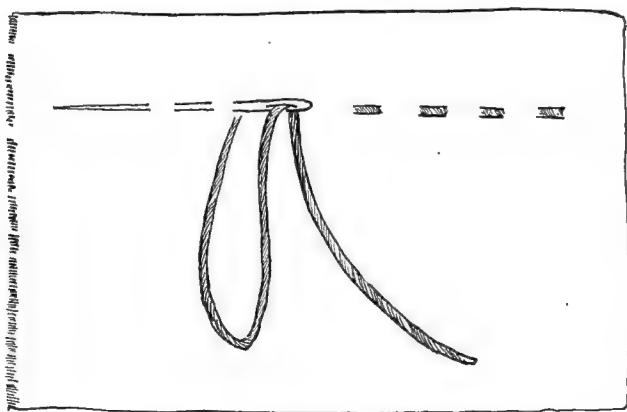
Measure from the bound edge $6\frac{1}{2}$ inches and fold on this line. Bind the three remaining raw edges. Fold the tape diagonally at the corners.

Baste twelve pockets for spoons each $1\frac{1}{2}$ inches wide. Sew with a running or fancy stitch, making the fastenings very secure at the ends.

Find the center of the remaining tape, then overhand it near the middle of one short side so the spoon case may be tied up.

The Running Stitch.

The running stitch consists of small, even stitches and spaces, following consecutively on both sides of a



Running Stitch.

material, the length being determined largely by the kind of cloth used.

Kimona.

Material:

4 yards crepe.

$\frac{3}{4}$ yards contrasting material (Satine).



Kimona.

Thread number 70.

Needle number 8.

Method: cut, using any good kimona pattern.

Make French seams under the arms, sewing them with the combination stitch.

The Facing: Put the right side of the facing to the wrong side of the kimona, being sure that edges are even. Pin, baste, and sew with the running stitch. Around the curve of the neck; clip back to the stitching, in order that the facing will turn smoothly. Turn the facing back on to the right side. Baste along the sewed edge. Turn in the raw edge $\frac{1}{4}$ of an inch, baste and hem.

Even the length around the bottom, and make a two inch hem in the bottom.

The Cooking Uniform.

The beginning of the series of lessons on the cooking uniform gives a good opportunity for a lesson on the "Choice of Materials."

It has been mentioned before that when a child is allowed to buy her own materials, she often gets a very poor quality, since she is not able to judge by the appearance and feel that the muslin is too heavy, or loaded with starch. Muslin so adulterated, on account of its harshness, is difficult to sew before it is washed and is very coarse when the starch is washed out.

The teacher cannot emphasize too strongly the necessity of becoming familiar with the appearance, feel, width and price of the standard materials.



Cooking Uniform.

Plan for Lesson.

1. Subject: Materials for Cooking Uniform.
2. Aim: To teach the importance of careful selection of material.
3. Materials needed for lesson: Samples of different goods suitable for Cooking Uniforms.
4. Preparation: If this lesson is taught in the Spring, when the new summer materials are coming in, the teacher might ask such questions as:—
 “Why do the merchants have the new materials so early?”
 “When does your mother plan and begin your summer clothes?”
 “How can we be good managers as our mothers are?”
 “What can we plan and make this year that we can use next year?”
 “Why is it necessary to wear uniforms?”
 (1) They protect one's dresses.
 (2) They give the class a good appearance.
 “What color will these uniforms be?”
 “What are the advantages of white aprons?”
 (1) They show when soiled and are apt not to be worn when soiled.
 (2) They give the class a good appearance.
 (3) They make the wearer more careful about her work.

5. Presentation: Have the children enumerate the white materials which might be suitable for the aprons.

Percale.
 Muslin.
 Linen.
 Cambric.
 Dimity.
 Indianhead.
 Longcloth.

See if any of these should be eliminated.

Linen is too expensive.

Indianhead is too heavy.

Longcloth and percale resemble cambric.

Thus the list may be reduced to muslin, cambric, and dimity.

Make a list of the advantages and disadvantages of each of these materials.

Muslin.

<i>Advantages.</i>	<i>Disadvantages.</i>
Wears best.	Hard to sew.
Price 12c.	Hard to wash.
Width 36 inches.	Hard to iron.

Cambric.

<i>Advantages.</i>	<i>Disadvantages.</i>
Wears well.	
Washes easily.	
Irons easily.	
Easy to sew.	
Price 12c.	
Width 36 inches.	

Dimity.

<i>Advantages.</i>	<i>Disadvantages.</i>
Pretty.	Does not wear as well as
Washes easily.	Cambric.
Irons easily.	
Easy to sew.	
Width 27 inches.	
Price 25c.	

The girls will decide that cambric is the best material for the uniforms.

The teacher should make it clear that there might be times when one of the other materials would suit the purpose better.

Give each girl a sample of each material discussed. Have her paste it in her note-book and write a paragraph telling when she would use each kind for her apron.

6. Summary: It is scarcely necessary to have a summary at the end, since the points are summarized as the lesson progresses.

Cooking Apron.*Review of previous stitches.**Material:*

White cambric $1\frac{1}{2}$ to 2 yards.

White thread number 70.

White thread number 40.

Number 8 needle.

Number 7 needle.

3 flat pearl buttons $\frac{1}{2}$ inch wide with 2 holes.

Method: To Cut: Measure the length of the skirt

and to this measure add six inches for hem and seams. Cut a length of material corresponding to this length. Fold it thru the center lengthwise. Measure down $\frac{3}{4}$ of an inch on the fold and cut from the selvedge to the $\frac{3}{4}$ inch point, thus sloping the front of the apron.

Measure the waist and add to this measure two inches, (one inch for lap and one inch for finishing). Cut two pieces, lengthwise of the material, for the belt, corresponding to this length and $2\frac{1}{2}$ inches wide. Measure from the center back waist line over the shoulder, to a point 5 inches to the right of the center front and on the waist line. Cut two pieces corresponding to this measure, lengthwise of the material, and $4\frac{1}{2}$ inches wide, for the shoulder straps. Cut a piece 9 inches by 12 inches for the bib, having the longer distance lengthwise of the material. One-quarter inch has been allowed on these measurements for seams.

To make: Fold $\frac{1}{2}$ inch then 5 inches at the bottom of the skirt of the apron. Pin, baste and hem. Divide the top of the skirt into halves and gather with two, long double threads, using fine stitches and placing them $\frac{1}{4}$ of an inch from the edge.

Fold $\frac{1}{2}$ inch then 2 inches at one end (which is 9 inches long) of bib. Pin, baste and hem. Gather the bottom of the bib, using the method employed for the top of the skirt.

Place one end of a strap at the bottom of the bib on the right side. Pin, baste and sew with a running stitch. Turn in the long edge of the strap $\frac{1}{4}$ of an inch and the ends $\frac{1}{2}$ of an inch. Turn the long edge just folded to the wrong side of the bib. Baste the strap, sew it to the bib with the hemming stitch and overhand remaining edges together.

Sew the other strap to the other side of the bib in the same way.

Find the center of the belt and the center of the top of the skirt of the apron. Pin the belt to the wrong side of the apron at these points. Draw up the fullness to fit (approximately $\frac{1}{2}$ of the waist measure). Pin, baste and sew with the combination stitch. Find the center of the bottom of the bib. Pin this point to the other long edge of the belt at the center, placing the belt on the wrong side of the bib. Draw it up having 2 inches of fullness; pin, baste and sew with the combination stitch. Turn in remaining long edges of the belt $\frac{1}{4}$ of an inch and ends $\frac{1}{2}$ of an inch. Turn in the edges of the other belt piece to correspond to the first, place it on top of the first half already used and baste, keeping edges very even. Hem the skirt and bib to this upper belt, and overhand remaining edges.

Work a buttonhole in the right end of the belt and sew a button on the left end. Sew a button 4 inches from each end of the band at the middle of the width.

Towel. (For Cooking Uniform.)

Material:

Cotton huck 18 inches by 18 inches.
 $6\frac{1}{2}$ inches of straight tape $\frac{1}{2}$ inch wide.
 White thread number 70.
 Needle number 8.



Supplementary Problem.

Method: Straighten material by drawing a thread.

Fold a $\frac{1}{4}$ inch hem along one raw edge. Before basting, place the two cut ends of tape together and under the hem so the tape forms a loop. Baste hem down over the tape and hem. Overhand the ends of hem. Fold a $\frac{1}{4}$ inch hem along the other raw edge, baste and hem.

Holder. (For Cooking Uniform.)

Material:

Quilted padding 6 inches by 6 inches.
 $1\frac{1}{3}$ yards of straight tape $\frac{1}{2}$ inch wide.
 White thread number 70.
 Needle number 8.

Method: Fold $\frac{1}{2}$ of the tape thru the center lengthwise. Begin at one corner of the padding, place half of the tape on one side and half on the other side, pin and baste. Use just enough tape to form right angled corners. To do this fold the tape at the finished edges keeping the fold diagonally thru the corners. Having basted the tape around the padding, sew on each side with a hemming stitch. Fasten threads securely. Turn $\frac{1}{2}$ inch then 3 inches at the other end of the tape, and sew the end down with the hemming stitch.

Table Showing Cost of Articles for Seventh Grade.

Article	Material	Per Yard	Cost	Total Cost
Doily	$\frac{1}{8}$ yard linen at.....	\$0.65	\$0.04	\$....
	2 skeins D. M. C. at 2 for...	.05	.05	.09
Towel				
Spoon case	$\frac{1}{2}$ yard flannelette at.....	.10	.05	
	$2\frac{1}{2}$ yards tape at.....	.01	.03	.08
Kimona	4 yards crepe at.....	.18	.72	
	$\frac{3}{4}$ yards satin at.....	.25	.18	.90
Cooking uniform				
Apron	$1\frac{1}{2}$ to 2 yards cambric at...	.15	.30	
	3 buttons at .....	.10	.03	.33
Towel	$\frac{1}{2}$ yard huck at.....	.12 $\frac{1}{2}$	.07	.07
	$6\frac{1}{2}$ inches straight tape.			
Holder	Quilted padding at.....	.02	.02	
	1 1-3 yards straight tape at.		.01	.03

INDUSTRIAL-ARTS MAGAZINE

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EDITORIAL

ANOTHER EDUCATIONAL FORCE.

THERE is always need of arousing public interest in the activities of the school. In planning a movement for the agitation of questions of public improvement or for strengthening the influence and support of an institution or undertaking, one will not wisely ignore certain organizations among the women of a community.

In many places the women maintain certain clubs that aim at civic improvement. At the meetings of such organizations, important questions relating to the betterment of the community are fully and intelligently considered and discussed. Frequently such clubs undertake exhaustive investigations and present full reports as a basis for discussion. Whatever attracts the attention of such organizations is sure of the widest publicity and the heartiest support for all its worthy features.

Teachers of the industrial arts should be awake to the importance of this avenue to the public mind. Such a force, if properly enlisted, can often do more in a few weeks than the unaided efforts of the teachers could accomplish in years, if at all.

It would be exceedingly wise early in one's stay in a community to become familiar with the purpose, the work, and the officers of the Woman's Club. It would further be a legitimate and wise move to ask such organization to familiarize itself with the purpose, the importance, and the needs of the industrial arts work in the schools of that community.

If one is so fortunate as to be asked to address such an organization, one can improve the opportunity to emphasize the importance, the plans and needs of his special work. Rightly presented, these will enlist not only the support of the club but also the hearty co-operation of the individual members, who are the parents of the boys and girls engaged in the work. Women's organizations are a great force that have not been as fully utilized for educational purposes as the tremendous possibilities merit and demand.

OPPORTUNITIES THAT COME TOO LATE.

THESE are fictions that never materialize. Opportunities that come too late are not opportunities at all. They are grim reminders of what *might* have been.

It is oft repeated that opportunity knocks once at every man's door. Well, maybe it does; but too often there's nobody home. We are accustomed to talking in platitudes about this and to pointing out the encouraging phases of it. Yet when we grow candid and look

about us, and examine things at close range, we are just about driven to this: "There's a good deal of disappointment in the world, and sooner or later it's coming to most of us."

Disappointment comes in a multitude of ways. To some it seems transient and insignificant. To others it is permanent and appalling. It may come as hopeless failure in tasks undertaken, or it may appear as a new and fine ideal impossible of realization. In the one case, there seems nothing to do but to rise under the blow, assume a new burden, and struggle on, perhaps to success. Many successes are attained in this manner. In the other case, the only consolation seems to lie in the comfort one may get in being faithful to an ideal.

Whatever fits one best to meet and grapple with life's disappointments is a godsend.

DRAWING AND CRAFTSMANSHIP.

IN a recent number of The London Studio, The Art Critic asks: "Are we beginning to forget what drawing means?" This question is followed by a statement that the modern school of art seems to have abandoned all idea of fine draftsmanship as it used to be understood and practiced.

There can be no doubt that in modern schools of graphical art, form study is not practiced in the painstaking way of the old masters or of the lesser masters of the past century. On the other hand, there can be no doubt that modern graphical art has produced a very much greater variety of effects and gives a greater variety of impressions than any period of art history that has preceded.

Man's and Nature's moods and fancies are now expressed graphically in such variety and abundance that the modern artist may well despair of producing new sensations. The great lesson in painstaking drawing to be gathered from the masterful work of the old masters is for the modern craftsman and designer rather than for the pictorial artist. The modern industrial craftsman has not forgotten the value of good drawing for the very good reason that he has never realized it.

The free use of drawing, as a means of developing a design, is rare indeed with American teachers and pupils. During the past year we have seen numerous classes at work in advanced schools making objects in wood, iron and other materials which had not been studied thru drawing before construction. In none of these classes has there been evidence of ability on the part of teacher or pupils to express forms freely thru freehand drawing.

In these classes, designs were either copied or assembled from parts of other designs, and made to fit and apply as they might. Here is one direction in which the ambitious teacher of the manual arts may seek improvement in his work. No teacher of the industrial arts can afford to forget what drawing means.

TOO MANY DIRECTIONS.

NOT long ago we heard a school superintendent lecturing to his teachers on the "Message to Garcia" and dwelling on the virtues of the messenger who accepted

the commission of delivering the message without asking any questions, and immediately started on the journey which ended in the delivery of the message. The superintendent urged his teachers to emulate the messenger and to deliver the message without asking for minute directions, and it is to be hoped that they did so.

We learned later that that superintendent issues very elaborate directions to his teachers specifying the methods they must follow in teaching every subject. They are given a formula which must be followed in teaching every problem in arithmetic, and each month they must submit a schedule of lessons for each class in every subject, and the schedule must be followed. Then we wondered at the inconsistency of the man when he lectured on the "Message to Garcia."

He had missed the lesson which there is for him in the subject which he chose for a talk to his teachers. The only directions which the president gave the messenger was to find Garcia and deliver the message to him. There were no hampering restrictions or red tape about it. The sender of the message was a great man, and such men inspire greatness in the men who work under them.

SAFETY IN SCHOOL SHOPS.

THE number of accidents in school shops seems to be increasing with the growth in the number of shops opened in schools. While this is to be expected, at the same time many of the accidents might be avoided by a little more care in placing and guarding machines and tools. In one shop recently we noticed that the starting box of the motor which operated the saw bench was ten feet from the saw itself. In case of accident, or something becoming fast in the saw, the operator would be compelled to walk ten feet to stop the motor. It would be much safer to have the switch within reach of the operator, or to have an emergency cut-out within easy reach.

The following are quoted from the rules of the United States Steel Corporation: "When chipping, provide yourself with a mask and eye shield and see that the tools are not battered, thereby preventing chips from injuring you. An effective guard shall be placed on emery wheel dressers to prevent the flying of broken pieces from the dresser." It might be well to see that these rules are observed in your shop.

SEEKS PENITENTIARY SENTENCE IN ORDER TO SECURE TRADE TRAINING.

THE following news item appeared in the Minneapolis Tribune July 11, 1915. It indicates a state of affairs which should be considered by Americans with anything but pride. Not only is it an indictment of the workhouse, but it shows the difficulties which prevent a man from learning a trade.

The penitentiaries are doing a great work in teaching trades to derelicts, but will society never learn the value of an ounce of prevention? Are we to continue putting a premium on cussedness?

John Morris, 24 years old, consented yesterday to plead guilty to burglary in the third degree on condition that Walter Newton, assistant county attorney, would urge that a penitentiary sentence be imposed in his case.

Morris was arrested last week charged with breaking into Solomon Baker's store, 1001 Third Street North.

"I thought probably I would get caught," he told Mr. Newton this morning, "but I didn't care. I am tired of living around as a day laborer, out of work most of the time and associating with tramps and hoboes."

"I want to learn a trade. I can't afford to go to school or to serve an apprenticeship on small wages. I thought if I got caught that I would be sent to the penitentiary where I would be taught a trade. Of course there is the disgrace of a prison record but I haven't any close friends, and no relatives so I don't care much about that. When I come out of the prison I will know how to do something by which I can earn a good living."

Morris stole nothing from Baker's place. He had merely succeeded in entering the place when he was arrested. Mr. Newton told him that under the circumstances he might plead guilty to unlawfully entering a building and get off with a short workhouse sentence.

"I thought it all over before I broke into that building. My parents died when I was young. I have knocked about, living with bums all my life. Sometimes when I had a dime I slept in a bed. A good deal of the time I didn't. I was sick and tired of it. The night I broke into the store I didn't have a cent. I stood in front of the window quite a while. I had never committed any crime before. I have been arrested a few times for vagrancy but that was not like stealing."

"Finally I made up my mind to break in. If I got away I would have enough money to eat on. As a matter of fact, tho, I expected to be caught. Sure enough I was, but five years from now if nothing happens I will have a trade and have reason to be thankful that I was nabbed."

"Well, I will take Stillwater for mine," said Morris. "I never went to school a whole lot and now that I am going I want to go to the best one even if it is strict."

SALARIES OF ELEMENTARY MANUAL TRAINING TEACHERS.

IT is difficult to understand the reason for the low salaries which are paid to manual training teachers in the elementary schools. Every person familiar with existing conditions realizes that the weakest place in our school system is found in the upper grammar grades. A large proportion of the children in these grades are over-age and retarded, and it is from these grades that a majority of the children leave school to go to work. It would seem that the obvious method of improving the conditions in these grades would be to improve the teaching in these grades. If better teachers are to be placed in these grades, it is only fair that the pay for this work be increased.

At present the teachers in these grades are interested in being "promoted" to the high school where salaries are better, the pupils are less troublesome, the equipment more adequate, and the "dignity" of the position very much more imposing.

At the same time the community is making great efforts to establish continuation schools, and industrial schools of various kinds, with comparatively high salaried instructors to do the work which should have been done in the elementary schools. In other words the schools much prefer buying the pound of cure to using the ounce of prevention.

Sometime, perhaps, we will awake to the fact that a poor teacher is a very expensive one in any school. While the salary that a teacher is paid is not always an indication of the ability or efficiency of that teacher, yet to acknowledge this is to recognize the unfairness of the present practice in paying teachers. Either the manual training teachers in the elementary schools are the most inefficient ones, or our salary scheme is unfairly adjusted. In either case, the conditions should be remedied.

PROBLEMS AND PROJECTS

The purpose of this Department is to present monthly a wide variety of shop projects which have been actually worked out in elementary, high, trade and continuation schools. Contributions are solicited and will be paid for.—THE EDITORS.

ANNOUNCEMENT

BEGINNING with January, 1916, THE INDUSTRIAL-ARTS MAGAZINE will award a monthly prize of \$10 for the best problem used in the Problems and Projects Department. This is not a competition. Every problem accepted for publication will be paid for. The prize will be simply a reward of merit.

From the material submitted by readers, the Editors will select each month for the award one problem of especial merit, judged from such standpoints as originality, good construction, artistic merit, adaptability to school work, and quality of drawings and photographs submitted.

The brief description of a constructed problem should be accompanied by a good working drawing and a good photograph. The originals of the problems in drawing, design, etc., should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are eligible for consideration.

Problems submitted after November 1, 1915, will be considered in making awards of merit.

A PANTOGRAPH.

R. J. Mullin, Lincoln Park High School, Tacoma, Wash.

AMONG the articles completed in the machine shop of the Lincoln Park High School, the Universal Draughting Machine, shown in the accompanying illustration, is perhaps the most notable. It was designed as an accessory to a very fine slate (blackboard) which is part of the equipment in the lecture room which serves the metal shops.

Any one who has ever undertaken freehand drawings on a blackboard will readily appreciate the value of an instrument that will, in a measure, remove the human

element and incidentally, the distortion that is almost sure to characterize all drawings so made. This machine is so simple and serviceable that any one with a rudimentary knowledge of mechanical draughting can use it advantageously. Drawings can be made to scale, accurately and, at the same time, more quickly than by ordinary methods. The design requires special equipment for its production.

Each piece was made in the shop. It was constructed by the pupils from rough stock and later installed in the lecture room, over the board referred to.

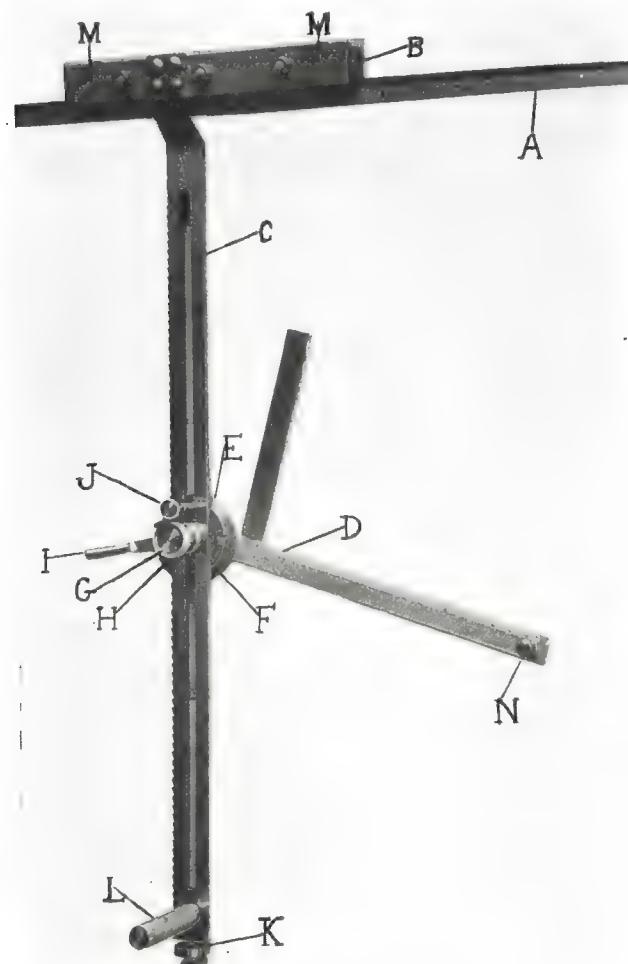
Referring to the accompanying illustration: (A) is a built up angle iron rail, extending the entire length of the board. One edge of the angle is finished true and serves as the track upon which the grooved rollers (M) run. (B) is the carriage and (C) is the vertical bar. Taken together they correspond to an ordinary tee-square and as previously suggested, can be moved to any point along the track. (D) is a 12-inch by 18-inch graduated square, with beveled working edges. It takes the place of both triangles and scales.

The square is carried on the protractor (E) which is graduated in degrees. (F) is the stationary part of the protractor, and has a tongue that fits into the slot in bar (C). Thru this tongue and thru the movable part of the protractor, there is a bolt, or center pin, from which the mobile parts are functioned. (G) is a knurled nut on this pin, which may be tightened to hold the protractor rigid, as will be described later. (J) is a plunger dowel-pin with a spring to force it into reamed holes in part (E). These holes are spaced fifteen degrees apart; there is one to hold the square at right angle with the board and one each at 15, 30, 45 and 60 degrees off the horizontal, both above and below. Any intermediate degree can be used by tightening nut (G). This clamps the entire head firmly in place. The ordinary draughtsman can draw but one line at a time, therefore this much of the machine takes the place of the tee-square, protractor, scales and a full set of triangles.

In addition to the above, there is incorporated into the construction, a cross-hatching, or section lining attachment.

The bar (C) is provided with a ratchet rack. In front of the protractor is lever (I), carried from the center pin and beneath nut (G). From lever (I) there is suspended a tool steel pawl (H), which serves as a fulcrum for (I). Behind pawl (H) is another and similar pawl, suspended from the stationary part (F) of the protractor. By manipulating lever (I), the entire head, square and all, can be worked up the bar, one-half inch at a time.

When section lining with this machine, it is necessary to begin at the bottom and work up. The action is quick and smooth. A very simple movement of lever (I), dis-



Drafting Machine made in Lincoln Park High School, Tacoma, Wash.

engages both pawls and allows the head to descend by gravity. (K) is a fiber wheel to hold bar (C) away from the slate. (L) is a knurled handle, used when moving the instrument along the rail.

As a whole, it is thoroly practical and a great time-saver. When a good drawing is completed and a record is desired, a photograph is taken of it and as many prints made as required.

HOW TO ILLUMINATE A PAIR OF INDIAN CLUBS.

By Milan G. Twichell, Supervisor of Practical Arts, Natick, Mass.

CLUB-swinging is one of the many exercises found in all good gymnasiums. It is very interesting to watch a class go thru the many graceful and difficult movements. How much more interesting, yes fascinating, to watch the expert handle the club! If the club-swinging has something "different" from the other fellow, how very quick we are to notice it. I have seen the so-called illuminated clubs many times and to me they were crude affairs, mostly

The illustration and description will give you a very clear idea of how it was done. The illustration in the right-hand side of the picture shows the light and collar as they go together, but removed from the club. The club at the left-hand side is shown with the collar in place, with the light removed. As the light and the cover are attached together, you simply unscrew the cover from the collar to remove the light from the club. The openings in these clubs are diamond-shaped, one and three-quarter inches by three inches. Study the following directions very carefully and you will have no difficulty in fixing your clubs like the ones shown here.

Get a pair of Indian Clubs, a fountain pen flashlight and the tin can-screw of an oil can (this can-screw may be obtained at most any tin or plumbing shop). Take the screw-cover and make a hole in it just large enough to receive the lower end of the flashlight.

Push this part down from the inside of the cover until the end of the spring touches the tin. Make a hole in the end of the club large enough to receive the flash-



Illuminated Indian Clubs and Lamps for Illumination.

wire cages with the electric light inside, sometimes a torch and even an oil lantern.

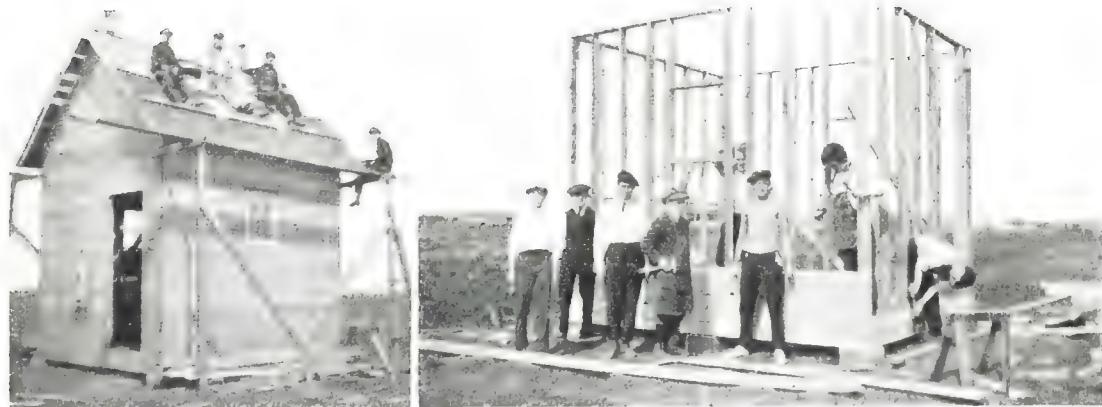
To those that have swung the illuminated cage with the wires attached, it is not necessary to point out the difficulty of concealing the wires, or the many times that the wires get twisted and broken. Also it is not possible to use this arrangement in a place where there is no electric current.

To do away with these objectional features the writer has produced an "electrically lighted storage battery" Indian Club. These clubs were fixed up for two brothers that are in one of the writer's manual-training classes. They use these clubs in giving exhibitions of club-swinging for their regular work. For an encore they have the lights in the room turned off, and simply turn on the light in the clubs. With the various colored lights swinging gracefully round and round, up and down, the sight is one that will please the most critical and exacting audience. These clubs have been tested by one of the best physical directors in the East and this is what he said about them: "A finely balanced club, the best thing I ever saw or heard of in an illuminated club."

light, without its touching the wood. Insert the flashlight in the club until the button on the flashlight is within about one-half inch of the end of the club. This will give you the length of the collar or extension of the club. Solder the collar and the can-screw together. Take the cover with the flashlight and screw it on tight to the collar.

Have the flashlight "central" with the collar, then solder it to the screw cover, being careful not to burn the insulation in the flashlight. Make a hole in the collar (this collar was made of good tin) opposite the button on the flashlight, just large enough to admit a "stove-bolt" screw.

Solder the nut on the inside of the collar, and turn in the screw from the outside. If correctly done the end of the screw will touch the button on the flashlight. Turn the screw in until the button makes the connection; cut off the screw even with the face of the collar, then file a small slot in the end of the screw to admit a small screw-driver. Carefully fasten the collar to the end of the club with three small round-headed brass screws. If you put



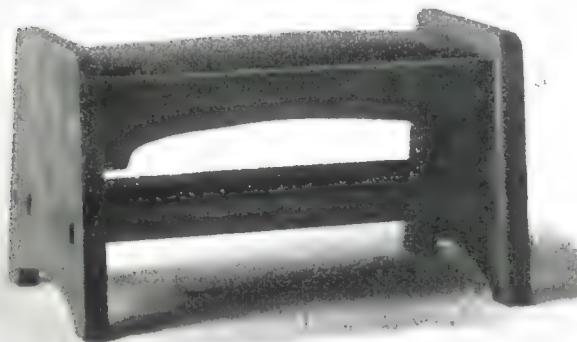
Toolhouse in Course of Construction.

this collar on "even" the flashlight will be in the center of the club.

Cut openings in the club to suit, and cover with different colored celluloid. Study the illustration carefully and you will have no trouble in making.

A PRACTICAL CARPENTRY PROBLEM.

A PRACTICAL carpentry job completed by the students of a Manual Training Department will be seen in the accompanying cuts.



Foot Stool.

The school board of Grand Forks, N. D., was in need of two buildings for its school farm. The buildings were to be used as toolhouses, and the cost of erection was to be limited to the lowest amount possible, consistent with good workmanship and materials.

The construction was done by students of the manual-training classes in the grades and high school. The buildings measure 10 by 12 feet each. One building is at present used by the Supervisor of Agriculture for an office; the other is used as a toolhouse by the students.

Class time only was given to the work. The boys were not paid wages, but credit was given as for any other subject of the school course. Lectures were given in class on the theory of building construction and carpentry terms, thus linking the practical with the academic side of school shopwork.

Much vim and enthusiasm were displayed by the boys. Unconsciously, a co-operative spirit was aroused, resulting in chummy relations among the members of the class and the teachers, and greatly facilitating the progress of the work.

The classes were under the direction of Mr. M. F. Pitman and Mr. A. E. Howell.

MAKING A FOOTSTOOL.

Francis J. Gottwald, Duluth, Minn.

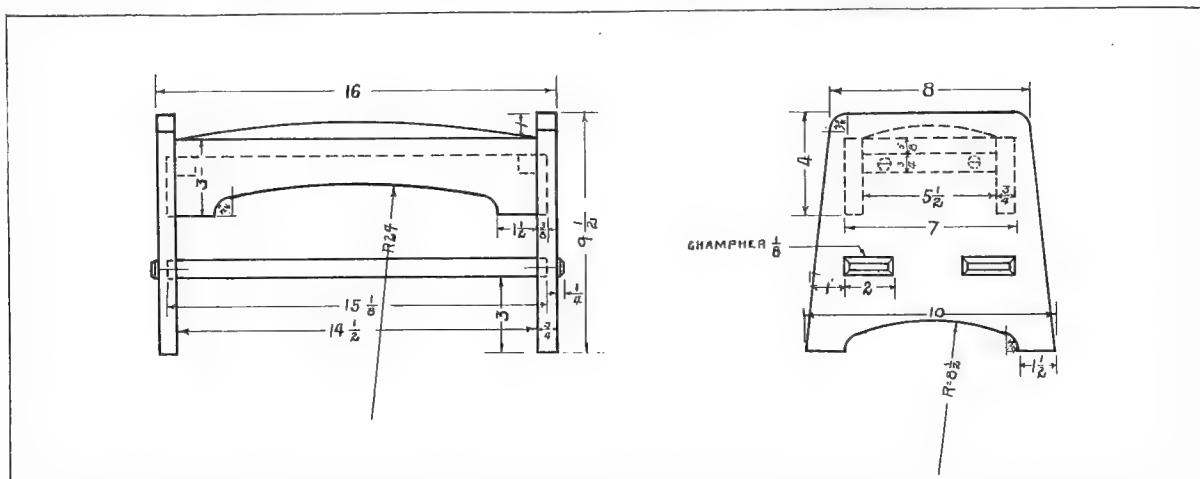
THE footstool, shown here, is a splendid exercise in Eighth-Grade woodworking. Simple construction in blind mortising and elementary upholstering is here involved.

Procedure in Construction:

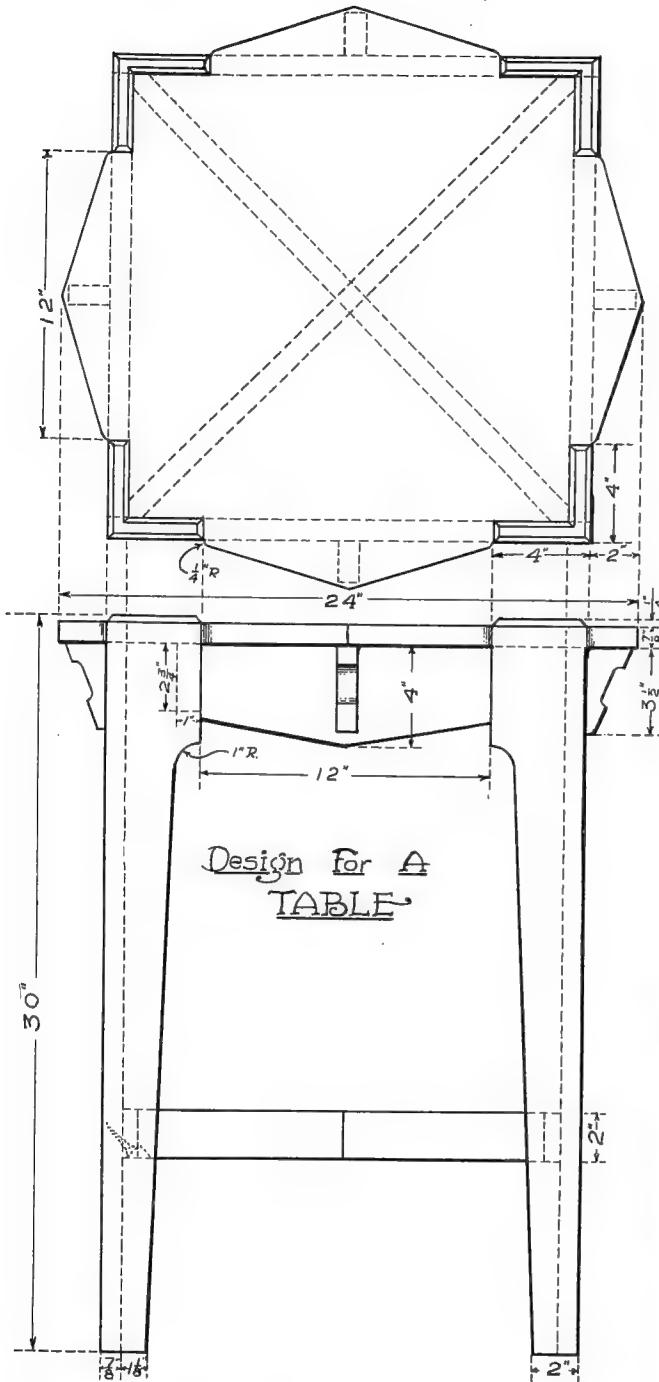
1. Select and cut out the rough stock, allowing 1" waste in the length and $\frac{1}{4}$ " in the width.

2. True the different pieces to the overall dimensions, with the exception of the two ends. In this case true two surfaces, one edge and one end.

3. Lay out the design. Do all laying out from the center line, the true edge, and the true end. It might be well to mention that the "center line" is a very important factor in all laying out processes; the student should remember the many advantages of its use. Use the try-



Working Drawings for Foot Stool.



Working Drawing for Table.

square in laying out all vertical and horizontal lines from the true edge and the true end.

4. Cut out all parts as laid out. Chisel out the blind mortises, being very careful that all are of uniform depth. Use the turning-saw to cut out the curved parts of the design. After all the inside work is done, cut off and plane the side rails and bottom braces to the exact lengths. If these are not cut exact, the stool, when assembled, will not be square.

5. Sandpaper all pieces separately before fastening them together. Great care must be exercised in this so that a clean and uniform surface may be had to receive the finish.

6. Glue and fasten together.

7. Make the cushion. To do this, first cut a $\frac{5}{8}$ " board to fit between the rails, allowing $1/16$ " space around the on the underside of one edge of the board; place the hair

entire board for underlapping leather; tack the leather on—be sure there are no holes in the filling; bring the leather over and tack to the under side of the opposite edge of the board. Before tacking the ends down, pound the top of the cushion with the palm of the hand, working from the center toward each end. Any filling that may project from the ends should be worked back under the filling with a steel rule. After the filling has been neatly and compactly arranged, tack down the ends in the same manner in which the sides were tacked.

Stock List.

MATERIAL: PINE.

Name of Pieces	No. of Pieces	Sizes
Ends	2	$10\frac{1}{2} \times 10\frac{1}{4} \times 1$
Side Rails	2	$16\frac{1}{8} \times 3\frac{1}{4} \times 1$
Bottom Braces	2	$16\frac{1}{8} \times 2\frac{1}{4} \times 1$
Cushion Braces	2	$6\frac{1}{8} \times 1 \times 1$
Cushion Board	1	$15\frac{1}{2} \times 5\frac{3}{4} \times \frac{5}{8}$

DESIGN FOR A TABLE.

Clark Woodward.

THIS problem is constructed of seven-eighths oak throughout. The top may be constructed as shown in the plan, or may be circular. Other variations are, of course, possible both in the top and the legs.

The main idea, however, is the formation of the legs by gluing two pieces at right-angles; these parts must be accurately jointed at right-angles and dressed off afterwards; very great care should be used in the quality of the glue as well as the jointing. An additional point of interest is the accurate fitting of the top into the space designed for it. Cutting the top slightly full of dimensions and adjusting with parings of the chisel, of course, is the best method.

We made a dozen of these tables. One made a grade of one-hundred per cent; the others fell slightly below this high mark. It is a good test problem of one's constructive ability, especially if he uses the jack plane as we did in all the jointing.



Tablet-Arm Chair designed and made in quantities in the Elementary Manual Training Schools, Cincinnati. Photograph by courtesy of Mr. E. A. Christy, Director of Industrial Education.

NEW BOOKS AND PAMPHLETS

Bookbinding and Its Auxiliary Branches.

In four parts. By John J. Plegier. Inland Printer Company, Chicago.

Part 1, *Paper Ruling* contains 73 pages. It describes paper ruling machinery, naming the parts and telling the work of each, and gives complete directions for the manipulation of ink in the machines. In all of the directions and descriptions the author has used terms which may be readily understood by novices, and the book will serve as an aid to both beginners and experienced bookbinders.

Part 2, *Pamphlet and Quarter Binding, Punching, Crimping, Eyeletting*, contains 110 pages, and is intended as an aid to bookbinders, librarians, and printers in charge of office work. It gives the definitions of terms used in binderies, describes the glues, cements and pastes used in the binding of books, and describes fully the methods of binding. The book closes with a chapter on waste paper baling.

Part 3, discusses *Blank, Edition, and Job Forwarding, Finishing and Stamping*, and contains 275 pages. Teachers will be most interested in this volume, as it describes fully the entire process of that class of bookbinding which is usually done in schools. The shop and hand methods of sewing, decorating and finishing a marketable book, are given in considerable detail.

Part 4, contains 90 pages and treats of *Gilt Edging, Goffered Edging, Marbling, Hand Tooling, and the Care of Books*. This part contains the so-called "secrets of the trade." Persons who have been rebuffed by marblers and gilders will rejoice to find a book describing the processes fully and in such a manner that they can understand it.

The fact that the books are published by the Inland Printer Company is a guarantee of the authenticity of the descriptions of processes of printing and bookbinding.

Geometrical Drawing.

By F. Schraadt, M. A. 66 pages. Whitaker & Ray-Wiggin Co., San Francisco, Cal.

A set of 60 practical plates for Geometrical and Elementary Mechanical Drawing with explanatory notes bound in convenient book form for class use.

Beginning with practice exercises with the T-square and triangles, the plates represent geometrical problems, projections, developments and lettering such as are essential in teaching elementary mechanical drawing.

Mechanical Drawing and Practical Drafting.

By Charles H. Sampson. 112 pages. Price, \$1.50. Milton Bradley Company, Springfield, Mass.

This is a series of 76 plates bound in substantial book form and offering the most needed geometrical problems, conventions, projections and developments for mechanical drawing, with detail or assembly drawing of machine parts and perspective drawing. Each of the plates is explained in the text.

It is the purpose of the author of this book to give a more extensive and practical course than the usual school text supplies.

A List of Helpful Publications Concerning Vocational Education. Bulletin of the University of the State of New York, number 600. Prepared by Mr. Louis A. Wilson, specialist in industrial schools. This list is a revision of a bibliography prepared several years ago. It is particularly strong in listing books for teaching the subjects commonly considered industrial arts.

Report of the State Director of Industrial Education for New Mexico. By Miss Manette A. Myers, director. In addition to a general survey of the general industrial work promoted by the state department in the form of industrial clubs, agriculture, domestic science and manual training, the report contains outlines and descriptions of the special activities in respective counties. The pamphlet is fully illustrated.

Correlating Agriculture with the Public School Subjects in the Northern States. By C. H. Lane and F. E. Heald. Bulletin 281, United States Department of Agriculture. This pamphlet follows the plan of a similar publication issued for the Southern schools in 1914. It contains outlines for each month of the school year for practical and field exercises in agriculture and for the correlation of this agricultural work with language, reading, arithmetic, geography, history, drawing, physiology and manual training. Suggestions for exhibits, garden plans, club work, laboratory work and score cards for judging farm produce are included.

Woodworking Industry, Clothing Industry for Girls, Collar Factories. These three valuable pamphlets embody information concerning three prominent industries in Rochester. They are intended to furnish boys and girls in the Rochester Industrial Schools with information that will assist them in choosing courses and in considering their possible future vocations.

Effects of Minimum Wage Determinations in Oregon. U. S. Bureau of Labor Statistics, Bulletin 176. A study of women's wages in Oregon since the minimum wage law of 1914.

Vocational Schools in Massachusetts. Issued by the Massachusetts State Board of Education. Document 6, 1915. (Whole Number 43.) A study of the continuation schools, training classes for vocational teachers and statistics of vocational schools of the state.

Statistics of Manual Training, Agricultural and Industrial Schools, 1913-14. U. S. Bureau of Education, Bulletin 644. This bulletin presents suggestive figures of 479 schools of the types named in the title.

Lessons in Elementary Agriculture for Alabama Schools. E. A. Miller, Specialist in Agricultural Education. Bulletin 258, United States Department of Agriculture. This bulletin has been prepared especially for the use of rural school teachers in Alabama. It should be of value in all Southern states. Eight lessons are outlined for each month of the school year, from September to April, inclusive. Only the salient features of each lesson topic are outlined, and specific references are made to the official textbook and to various bulletins easily accessible to teachers.

THE importance of elementary agriculture as a school subject is generally recognized in the cotton States, and it is now being taught to some extent in the rural schools. A new United States Department of Agriculture bulletin, No. 294, *Lessons On Cotton for the Rural Common Schools*, is made up of a series of lessons, exercises, and references on every operation in the growing of cotton, based on economic production. These are intended to supplement the organized school work in elementary agriculture and to furnish material that cannot otherwise be obtained.

The lessons are designed to make the growing of cotton a part of the school work, and thus, in addition to the textbook instruction and laboratory work, to give the boy a practical working knowledge of the best farm practice.

The bulletin, which is intended for teachers and others interested in school work, contains a series of fourteen lessons, with topics of study, exercises, and references to available agricultural publications containing information on each lesson subject.

A list of suggested correlation exercises is also included. More information upon this subject may be obtained from Department Bulletin 132, *Correlating Agriculture with the Public School Subjects in the Southern States*. Both bulletins may be had upon application to the Division of Publications, United States Department of Agriculture, as long as the supply lasts.

ITEMS OF CURRENT INTEREST

THE NEW ORLEANS VOCATIONAL SURVEY.

DR. DAVID SPENCE HILL, Director of the Division of Educational Research of the public schools of New Orleans, La., has completed a vocational survey of local industries preparatory to the establishment of the Delgado Trade School. The results of the survey are contained in a 400-page volume, which is to be printed and issued in the near future.

Dr. Hill proposes that the control of the Delgado Trade School be vested in the Board of School Directors. This board is to be assisted by an associate council, to be selected by the city council and to consist of six persons not members of the school board. The personnel of the council will be broad in scope and will consist of two manufacturers, two public-spirited citizens, the president of the school board, the superintendent and the Director of the Delgado School.

The Council will work under the direction of the board and will devote its attention to the practical training of boys in the mechanical trades, a part of which will include English, shop mechanics, mechanical drawing, sanitation and hygiene.

In making the survey, trades schools in a number of cities were visited and analyzed, and several hundred occupations of men and boys in the local manufacturing establishments were studied. Attention was given to the nature of occupations, skill and knowledge required, wages, steps of promotion, etc.

The report contains a large amount of data on scores of occupations and is intended to be of general use in the matter of vocational guidance, aside from its primary purpose of adjustment for the Delgado School. It reproduces actual notes concerning approximately 100 factories visited, in addition to payrolls, equipment and other facts. Definite suggestions are given for a general program and course of study adapted to local needs and conditions. These are:

1. Boys 14 years of age and older, who usually will go no further than the sixth grade of the elementary schools.

2. Older and more advanced boys, ready to learn a trade in smaller numbers.

3. Youths and men in industry who desire either to improve their skill and knowledge or to change their occupation by means of evening classes and part-time courses.

The school as planned, will be organized into two departments, namely, the preparatory trades department for boys 14 to 16 years of age, who form a class difficult to hold in school, and the practical trades department providing four divisions for the intensive teaching of trades in whole or in part. A wide range of courses for unit evening and part time classes has been prepared based upon local needs and the experience of other cities.

ART EDUCATION AT THE PANAMA-PACIFIC EXPOSITION.

ART EDUCATION Day was fittingly observed at the Panama-Pacific Exposition by special exercises held in the Palace of Education on August 18. The meeting was presided over by Royal B. Farnum of the New York State Department of Education. The meeting was opened by the presentation of a commemorative bronze medal by an official of the Exposition.

Mr. Farnum graciously received the medal and in his brief response stated that much credit for the finest of world expositions was due to the influence of art and manual training teachers thruout the United States. Thru their teaching and example the common people have been led to an appreciation of the beautiful while individuals have been given the incentive to great achievements as artists.

The first formal paper on the program was read by Miss Florence Ellis, formerly Supervisor of Art at Cleveland, O. Miss Ellis, who has travelled in nearly every state in the Union investigating art and industrial conditions, gave an optimistic view of the situation. The industrial arts are today stronger in the public school curricula than ever before. The trend of the work is largely industrial and related to the immediate environment of the individual.

Miss Ellis was followed by Mr. C. Valentine Kirby, Supervisor of Industrial Arts in the Pittsburgh schools, who spoke on "The Exposition as a Test of the Past and Guide to the Future of Art Education." The exposition seemed to Mr. Kirby to typify the growing taste and development of the people and as a guide it displayed, as in no previous exposition, the great value of adherence to the elementary principles of beauty which art teachers try to instill into the minds of the children. Such principles as unity, harmony, balance, rhythm, etc., are fundamental if beauty is to be the result.

"The College and the University Exhibits" were discussed by Prof. A. B. Clark of Stanford University. Professor Clark gave some very helpful suggestions and directions for those who were interested in the exhibits of colleges and universities. He pointed out new features which were being tried and offered interesting comment on certain work.

Mr. Royal B. Farnum then spoke of "The Future of the International Art Congress." Mr. Farnum announced the indefinite postponement of the Fifth International Art Congress which was to have been held in Paris in 1916 and stated that possibly this country would assume the responsibility of holding it on this side of the Atlantic at some future date. In any event the efforts of the American Committee must be directed toward securing government recognition of this world art meeting.

Mr. H. Shugio, Art Commissioner of the Imperial Japanese Commission, followed Mr. Farnum with a paper on "Japanese Art," giving a brief statement of the Ukiyoye masters, their history and their characteristics. In each instance, he noted a painting illustrating each point to be seen in the Japanese exhibits of the Fine Arts Palace.

The meeting was closed with a paper by Mr. Robert Harshe on "The Exhibits in the Fine Arts Palace." Briefly reviewing the problem to be met in installing such an exhibit of painting, Mr. Harshe finally gave a most valuable talk on the chronological arrangement of the pictures and made helpful suggestions as to the most direct and the easiest way to see the things most worthwhile in the Palace of Fine Arts.

A PAN-AMERICAN EDUCATION CONGRESS.

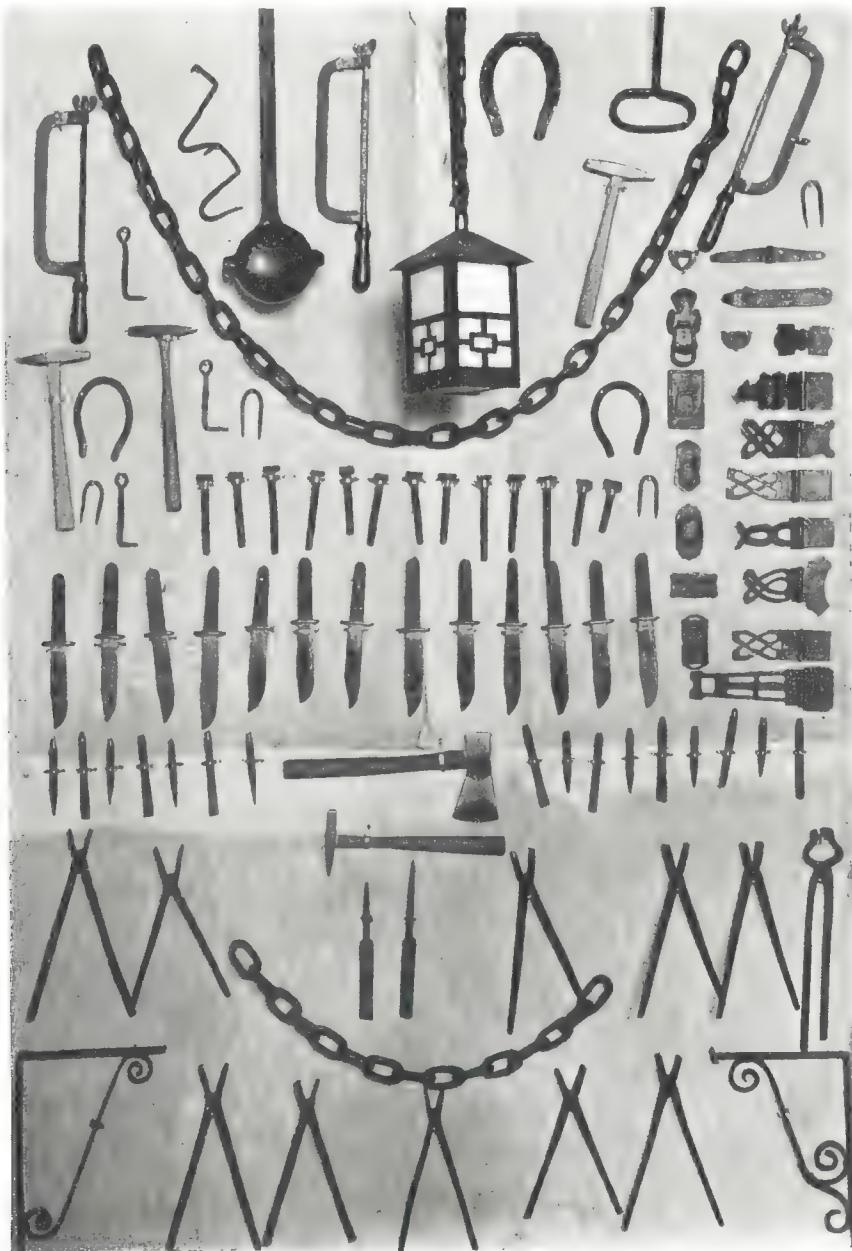
THE SECOND PAN-AMERICAN SCIENTIFIC CONGRESS which is to meet in Washington from December 27, 1915, to January 8, 1916, will feature education in a series of Conferences to be led by United States Commissioner of Education P. P. Claxton. Prominent educators and educational officers from each of the republics of the Pan-American Union have been asked to participate in the Conferences which are being arranged by the Pan-American Union, and which will be held under the Auspices of the United States Government.

The Congress will be divided into nine sections, each to be led by a prominent American scientist. Education will be officially known as section four, and will be led by Dr. P. P. Claxton. Industrial Education will be one of the prominent sub-sections of the Education Section. It will be headed by Mr. Wm. T. Bawden, agent of the United States Bureau of Education. The program of the sub-section will be based upon the following outline and questions:

"The countries of the Western Hemisphere have been slower than those of Europe to appreciate the necessity for industrial training. The United States is fast becoming an industrial democracy. The same trend of evolution has already appeared in certain countries of Central and South America and with the increase in population will soon appear in all. The educational philosophy of the democracies of the New World demands training for the occupations followed by the majority of the people. Moreover, national prosperity depends upon such training.

dustrial education. In the United States the latest phase of the movement for industrial education has led to an effort to fit the individual to the type of industry best suited to his tastes and talents. Vocational guidance, by wise and sympathetic persons who are acquainted both with industry and education, is claimed to be the logical corollary of industrial education in a democratic state.

"What should be the place of industrial education in the school system of the American republics? Should it be supported by public taxation? Should it be considered



ARTICLES FORGED IN THE HIBBING, MINN., HIGH SCHOOL.

Without it, it is impossible to meet the commercial competition of the nations of Europe, where this type of training has been developed to a high degree of efficiency. It is, however, as yet undecided to what extent opportunities for industrial training should be included in systems of public education. If secondary education is to be provided generally at public expense, shall it include industrial training? Shall training for the simpler forms of trades be introduced into the elementary schools? The co-operation of public schools and employers of labor is fundamental for the creation of practical schemes of in-

as a function of the public school system? Should it be given in a separate system under separate control? How and to what extent may industrial schools co-operate with employers of labor?"

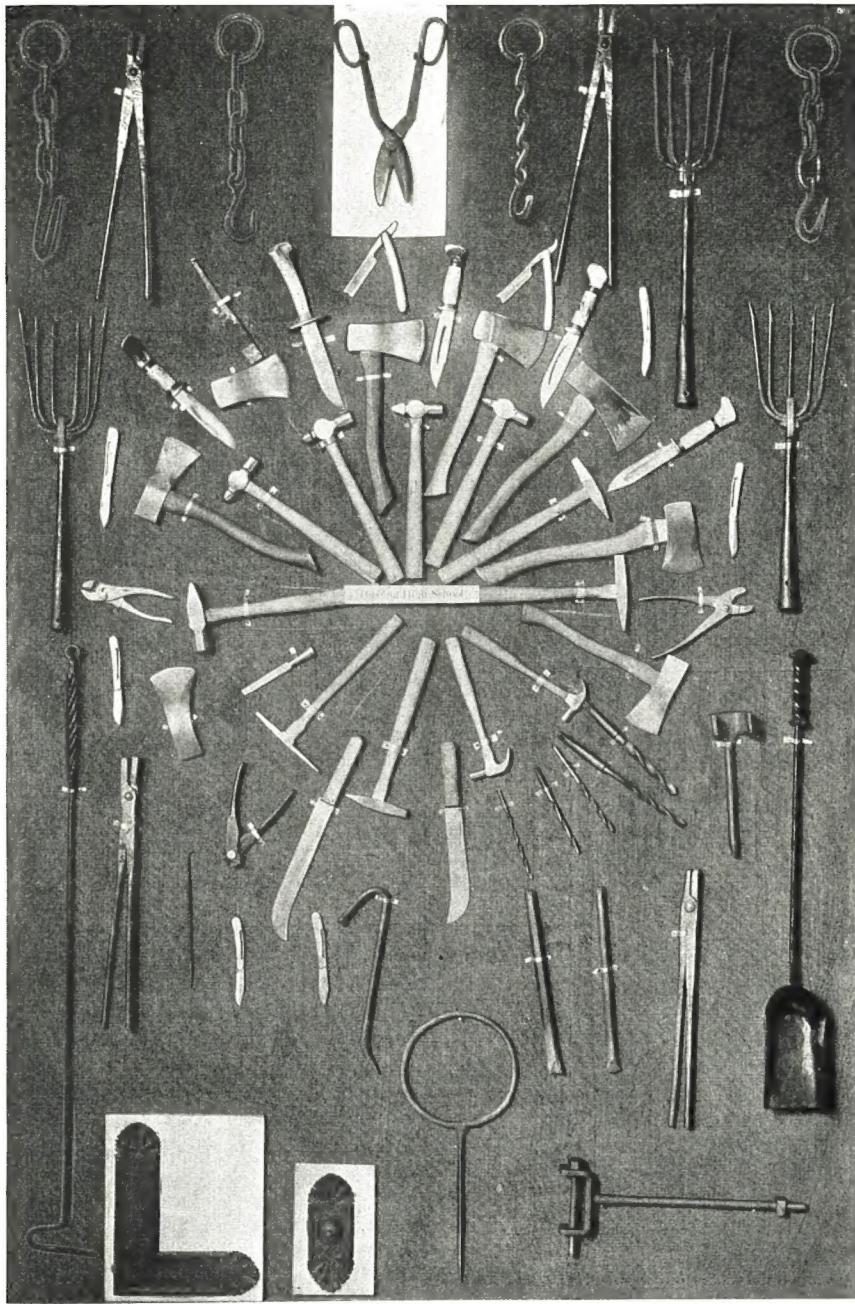
HOME ECONOMICS CONVENTION.

THE AMERICAN HOME ECONOMICS ASSOCIATION, which held its annual convention at Seattle, during the last week of August, reflected in its papers and reports the remarkable progress which is being made in Household Education thruout the United States. A report presented

by a special committee of the Association shows that seven states in the Union now have state supervisors of Household Economics for the public schools. Five other states have supervisors which devote a portion of their time to the inspection of Domestic Science and Household Arts classes. Sixteen state superintendents outside of the twelve states indicated above, have signified their intention of agitating for the extension of Household Arts classes

Secretary—Mrs. Alice P. Norton.

A Board of Councilors to serve five years, were elected as follows: Mrs. H. W. Calvin, of the United States Department of Education; Miss Mary E. Sweeney, head of home economics at the University of Kansas; Miss Alice Loomis, of the University of Nebraska; Miss Fannie Twiss, supervisor of home economics for the province of Saskatchewan, and Miss Ednam White, of the University of Ohio.



ARTICLES FORGED IN THE HIBBING, MINN., HIGH SCHOOL.

thru some form of state supervision. The Association at the close of its sessions elected the following officers:

President—Miss Martha Van Rensslear, head of the home economics department of Cornell University, Ithaca, N. Y.

Vice-President—Miss Abbie L. Marlatt, professor of home economics at the University of Wisconsin.

Treasurer—William Morse Cole, professor of economics at Harvard.

INTERESTING FORGE EXHIBIT.

THE illustrations on pages 224-225 are taken from an exhibit of forge work by students of the 7th Grade and of the High School at Hibbing, Minn. The boys in the 7th Grade who are members in the class conducted by Mr. J. F. Knowlton range in age from 12 to 15 years, while the high-school boys were from 16 to 19 years of age. The 7th Grade class spends three hours each week in the forge shop and the high-school students one hour and a half each day. Many of the projects have a direct industrial

value in that they are related to the local trades and the agricultural and timber interests.

CINCINNATI, O. A course for druggists has been introduced at the Woodward High School for the benefit of clerks employed in local drug stores.

WEST DULUTH, MINN. The Denfeld High School opened with a printing department and a capacity enrollment. The department has an equipment of type cases, printing presses and accessories, and is under the direction of the faculty of the English department.

INDUSTRIAL EXHIBITS IN THE INDUSTRIAL ARTS SCHOOL.

THE suggestion of Prof. Crawshaw in his articles on the "Organization of Teaching Material for the Industrial Arts" that each school collect illustrative material, has led to a large number of inquiries directed to the Editors of the INDUSTRIAL-ARTS MAGAZINE. Inquiry among leading manufacturers and dealers in various lines led to the conclusion that firms are exceedingly glad to co-operate with school authorities in preparing exhibit material and that a little thought and time and a little effort on the part of teachers will result in a very creditable and valuable collection of specimens.

It is suggested that teachers apply for exhibit material thru local dealers from whom they regularly buy.

The following list is not complete but is offered as a basis for further study and investigation on the part of teachers.

Agricultural Materials.

International Harvester Company, Agricultural Extension Department, Chicago, Ill.—Fiber exhibit consisting of sisal and manila fiber with small sample balls of the twines. Charts and a large number of pamphlets are available at cost price. Also slides and lectures.

Cement.

Alpha Portland Cement Co., Easton, Pa.—A School Talk on Portland Cement, describing the composition, manufacture and use of cement. Includes plate with directions for making a concrete trough. Mailed free on request.

CORN PRODUCTS. The Corn Products Co., 17 Battery Place, New York. **Electricity.**

Western Electrical Instrument Co., Newark, N. J.—Lectures on electrical apparatus and experiments in

pamphlet form; also, slides of electrical instruments and of diagrams illustrating electrical principles. Furnished at cost to teachers.

Hardware.

The Brainerd Manufacturing Co., East Rochester, N. Y.—Will gladly furnish Manual Training schools with sample boards consisting of box, chest and trunk trimmings, automobile and refrigerator hardware and a general line of cabinet hardware, upon request.

J. Wiss & Sons Co., Newark, N. J.—Exhibit entitled "Wiss Shears in Principal Stages of Manufacture" will be furnished to any school having an enrollment of three hundred or more pupils. No charge is made for the exhibit except transportation charges.

Needles.

Clark Thread Co., Newark, N. J.—Needles.

Paints and Wood Finishes.

The Bridgeport Wood Finishing Co., New Milford, Conn.—Finished wood samples and literature furnished provided that, if the samples prove satisfactory, the school will adopt them.

Devoe & Reynolds Co., Chicago, Ill.—Color cards, wood panels and printed instructions and directions pertaining to any of their products, free upon request.

The Lawrence-McFadden Co., Philadelphia, Pa.—Will furnish schools, free of charge, panels to be used for exhibition or educational purposes.

Patek Brothers, Milwaukee, Wis.—Will furnish exhibits of their paints, varnishes and wood finishing products free to trade and manual training schools. These exhibits consist of color charts, wood panels with the actual finish, specifications and all information necessary for the proper selection and application of their products.

The Sherwin-Williams Co., Cleveland, O.—Raw material exhibit consisting of tube of white lead, zinc, dry colors, linseed oil and other ingredients used in the making of paints and varnishes, sent to schools and colleges of standing, free of charge. Samples of varnish gums and a piece of linseed oil process cake is also furnished. This exhibit includes a complete article on the manufacturing of paints and varnishes.

Pins.

National Pin Co., Waterbury, Conn.—Pins.

Sewing Machines.

Singer Sewing Machine Co.—Wall chart showing transparent drawings of four-lock stitch sewing machines



Exhibit of Furniture Designed and Made in the Geneseo Township High School, Geneseo, Ill.
Mr. L. E. Walters, Director of Manual Training.

and pamphlet on the mechanics of the sewing machine. Free from any agent of the company.

Silver Ware.

The American Silver Company, Bristol, Conn.—Card showing the evolution of a teaspoon sent to schools upon receipt of 50 cents in stamps to cover the cost of carding and shipping of goods.

Textiles.

Pacific Mills, Lawrence, Mass.—Samples of both plain and printed cotton dress fabrics to principals, teachers or parents.

Whittal Carpet Co., Worcester, Mass.—Samples of raw material showing the different stages of manufacture in the making of carpets can be obtained under special conditions thru local dealers.

James Livingston Flax Company, Yale, Mich.—Linen.

Storey Cotton Company, Philadelphia, Pa.—Literature on the manufacture of cotton.

Thread.

Clark Thread Co., Newark, N. J.—Case showing the preparation of cotton can be obtained under conditions which can be learned upon inquiry.

Corticelli Silk Co., 622 Market St., Worcester, Mass.—Samples of silk and cotton thread.

NOW, ARE THERE ANY QUESTIONS?

Readers are urged to ask questions concerning the Industrial Arts. The editors will reply to those questions which they feel that they can answer, and to other questions, they will obtain replies from persons who can answer them authoritatively.

Bird Houses.

Amherst, O. Q:—Will you please tell me of any books or pamphlets that will give me ideas on different kinds of bird houses?—S. B. F.

A:—The following books will be helpful:

Bird Houses. By W. R. Eckardt. (Praktischer Vogelschutz.) Published in Germany. G. E. Stechert & Co., New York.

Birds and I. By L. H. Bailey. College of Agriculture, Cornell University, Ithaca, N. Y.

Handicraft for Handy Boys. By A. Neely Hall. \$2. Lothrop, Lee & Shepard, Boston, Mass.

Harper's Outdoor Book for Boys. By J. H. Adams. Harper Bros., New York.

Useful Birds and Their Protection. By E. H. Forbush.

PAMPHLETS.

Bird Architecture. \$0.20; with birdhouse, \$1. Crescent Co., Toms River, N. J.

Bird Houses Large and Small. Mathews Mfg. Co., Cleveland, O.

Bird Houses and How to Build Them. By Ned Dearborn. Farmers' Bulletin 609, United States Department of Agriculture (1915).

Iowa Boys' and Girls' Club No. 8. Manual Training, Part II. Published by the Agricultural Extension Department, Ames, Ia.

Manual Training for Rural Schools. Quarterly Bulletin of the Milwaukee County School of Agriculture, Wauwatosa, Wis. Vol. 4, No. 4, Feb., 1915. Prepared by L. M. Roehl, Wauwatosa, Wis.

ARTICLES IN PERIODICALS.

Amateur's Birdhouse. By S. F. Stevens. American Homes, 7:264-5. July, 1910.

Bird-box Experiences. Dutcher. Birdlore, 12:210-2. Sept., 1910.

Bird Home on a Country Estate. By H. Saylor. Country Life, 14:35-8. May, 1908.

Bird Houses for the Backyard. By A. N. Hall. Ladies Home Journal, 26:85. April, 1909.

Bird Houses and How to Make Them. By R. Ward. Country Life, 25:114. March, 1914.

Tools.

Mack & Company, Rochester, N. Y.—Exhibit consisting of a process board showing twelve stages in the manufacture of a carving tool. Can be had for cost.

The L. S. Starrett Company, Athol, Mass.—Exhibit of combination square showing the different parts, blades, stocks, etc., in the stages of manufacture. Detailed information can be obtained by writing the firm.

Simonds Manufacturing Co., Fitchburg, Mass.—Exhibit consists of board showing the progressive steps in the manufacture of a hand saw blade and handle. Contains sections of blades showing the four principal manufacturing steps, also pieces of handle showing steps in the making of handle. The board contains one complete saw. Conditions under which these boards are placed in Woodworking Departments of Manual Training or Technical Schools can be learned upon inquiry. Blueprints showing Rip Saw, also Cross-Cut or Cutting-off Saw Teeth, greatly enlarged, can be obtained by writing for them.

The Russell Jennings Manufacturing Company, Chester, Conn.—Board showing the seven different stages of manufacture of an auger bit sent to any school provided it has a carpenter shop with fifty or more students and provided that the school will pay the express or postage on the board.

Bird Refugees. By G. S. Warner. Outlook, 92:905-6. Aug., 1909.

Bird Sanctuary for the Sign of the Wren's Nest. By Mrs. J. O. Parmele. Birdlore, 16:170-1. May, 1914.

Bird Shelter. By F. M. Chapman. Country Life, 10:78. May, 1906.

Blind Man's Bird House. By T. Timmons. Country Life, 14:102. May, 1908.

Boxes for Birds with no Nesting Material. By F. C. Pellett. Birdlore, 13:79-82. March, 1911.

Boys' Bird Houses. By A. N. Farmer. Ladies Home Journal, 31:25. March, 1914.

Making Bird Houses. By R. Ward. Country Life, 25:106. Feb., 1914.

Making of Birdcraft Sanctuary. By Mabel O. Wright. Birdlore. August, 1915.

Placing Bird Houses in Public Parks. By R. K. Nabours. Elementary School Teacher, 7:511-2. May, 1907.

Propagation of Wild Birds. By H. K. Job. Outing, 53:768-72. March, 1909.

Protecting and Breeding Wild Birds. By H. Whipple. Craftsman, 21:270-81. Dec., 1911.

Value of Bird Refugees. Outlook, 93:242-3. Oct., 1909.

A Woodworking Course for Rural Schools.

Somerville, N. J. Q:—Can you suggest a woodworking course applicable to a rural community?—G. F. G.

A:—Probably the best book dealing with this subject is *Farm Shop Work* by Brace and Mayne. American Book Co., New York and Chicago.—S. J. V.

Wood for Wood Engraving.

Williamsport, Pa. Q:—Can you tell me what kind of wood may be used for wood engraving for press work? I want our boys to make cuts to be used by the job printer.—R. F.

A:—Boxwood certainly gives the best results from the printer's point of view, but it is not easily procured, is not easily worked and is expensive. Fair results have been secured by the use of black walnut, cottonwood and basswood. These are treated with a coat of hard wood

filler as in finishing wood. This fills the pores and makes a uniform impression.—*S. J. V.*

Reducing Bees Wax.

Crandon, Wis. Q:—How can honey-comb, direct from the hive, be refined to the commercial bees-wax?—*B. J. R.*

A:—The process of refining honey-comb into bees-wax depends largely upon the amount of comb to be reduced. Bee-keepers who have a great quantity of comb use a wax extractor or wax press. There are several of these on the market and full information about them may be had from the A. I. Root Co., Medina, Ohio.

A description of the leading processes will be found in *Wax Craft* by T. W. Cowan, published by Sampson Low, Marston & Co., London, England. Sold in the United States by A. I. Root Co., Medina, Ohio. A brief outline will also be found in *First Lessons in Bee-keeping* by T. G. Newman; published by the American Bee Journal, Chicago, Ill.

If a small quantity of comb is to be rendered, the hot water method will suffice. The combs are pressed to clear them of honey and are soaked 24 hours in soft water. The object of soaking is to impregnate the skins of cocoons with water and to dissolve the larval excrement. The combs are then broken up and put into a canvas bag. The bag is placed in a tinned receptacle and boiled very gently for fifteen to thirty minutes. The bags are kept floating below the surface of the water by weighting down with stones or other heavy objects. Great care must be taken not to boil too fast so that the wax will not be over-heated. If this happens, it will become brown and dry and less desirable for the market.

When most of the wax has been extracted the bag is removed and squeezed between two boards to remove the wax which has not percolated thru the canvas. The scum is removed from the top of the surface, and the boiler is covered with cloths so that the wax and the water cool as slowly as possible. When cold the cake of wax is taken out. The discolored wax at the bottom of the cake is scraped off and the fine wax is heated a second time. In re-heating, the scum is removed a second time, and the wax is cast into cakes for the market.

The refuse and scum which has been gathered may be again heated if there is a sufficient quantity until the last trace of clean wax is removed.

Western Drawing Association Report.

Ohio. Q:—Can one buy the Reports of the Western Drawing and Manual Training Associations? What is the membership fee?

A:—Reports may be had from Miss Emma M. Church, Harvester Building, Chicago. Membership fee is \$2.00 per year. Price of the Report is fifty cents.

Mending Broken Plaster Casts.

Bowen, Ill. Q:—Will you please tell me how to mend the broken arm of a figure in plaster of Paris? Will filling the crevice with plaster of Paris and repainting the break be satisfactory?

A:—Plaster of Paris is too porous and fragile to mend with an adhesive alone, unless the broken surface is very large in proportion to the size and weight of the piece.

The way to mend broken plaster effectively is to hollow out and roughen the broken ends; saturate them thoroly with water; tie the parts together in their proper place and run plaster mixed thin with water, into the hollowed opening.

If the broken section is small it is advisable to put a wooden or metal dowel between the parts.

To mix plaster of Paris, sift the plaster into water and do not mix the water with the dry plaster.

When the plaster is thoroly dry the mended part may be smoothed with a knife and sand paper, and a thin coat of shellac put on to fill the pores of the plaster.

After the shellac is dry, a coat of oil paint, of the color desired, mixed with gasoline, may be applied.

Collecting Lumber Bills.

Turners Falls, Mass. Q:—What is the best way of collecting lumber bills from pupils in a school where they are charged for all lumber used? I find it hard work to make pupils pay their lumber bills. Is there any system that would help?—*A. G. W.*

A:—Your problem has given me considerable trouble as no doubt it has with other manual training teachers. In one school where the pupils were compelled to pay for all lumber used, I made a careful estimate of the amount of lumber which would probably be used by the class, and divided that by the number of pupils, and required a payment of that amount from each pupil at the beginning of the term. My troubles were then over in that respect for the term.

When the boys in another school were making large projects, I had each boy make his drawing and a bill of material. After checking over the bill of material in order to insure its correctness, I sent the boy to the lumber yard to purchase his own material. The matter of collecting the money was then transferred to the man at the lumber yard. I think the experience of making the bill of material and purchasing the lumber was an excellent one for the boy.

Will some reader who has successfully or satisfactorily solved the problem kindly write us of his method?—*W. H. H.*

Books on Machine Drawing.

Oxnard, Cal. Q:—Can you suggest a good book on "Machine Drawing" which covers the theory and practice of gear drafting, suitable for use in third-year high school classes?—*W. M. C.*

A:—From a very complete bibliography just completed in this department, I select the following:

Machine Drawing. By G. C. Anthony. D. C. Heath & Co., Boston.

Engineering Drawing. By T. E. French, McGraw-Hill Co., New York.

Advanced Mechanical Drawing. By A. P. Jamison. Wiley and Sons, New York.

Mechanical Drawing for Trade Schools. By C. C. Leeds. Van Nostrand & Co., New York.

None of these books, in my judgment, covers the work of gear drafting in a very satisfactory manner. I know of no book which does, outside of the Scranton Correspondence School Courses and possibly our own Extension course.—*F. D. C.*

Marbling the Edges of Books.

Q:—I have been searching for some literature which describes the process of marbling the edges of books. Can you give me any assistance?—*A. L. F.*

A:—Part four of a series of books on *Bookbinding and Its Auxiliary Branches*, by John J. Pleger, published by the Inland Printer Company, describes the process quite completely. It gives a drawing of the table to be used and describes all the mixtures.—*W. H. H.*

Cork Board.

Mechanicsville, N. Y. Q:—Kindly advise me, thru your columns, where I can obtain the material which is used for display boards in Normal Art schools and elsewhere? It receives a thumb tack very readily and leaves no hole when withdrawn. It is apparently a composition of cement and cork or similar material.—*G. F. V.*

A:—Cork sheets suitable for use in a bulletin board may be obtained thru any first-class carpet house. The material is made by such concerns as the American Linoleum Manufacturing Company, 366 Fifth Ave., New York City and the Armstrong Cork Company, Pittsburgh, Pa.

If you want a cheap bulletin board that your boys of the Manual Training Department can design and make, we would suggest that you use a sheet of beaver board. Any lumber dealer can supply it.